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SUMMARY OF RECENT ABSTRACTS*

VII. HELMINTHIASIS †

TREMATODES

Schistosomiasis

General

AZIM (p. 56) made a survey of schistosomiasis in South-West Asia. No snail hosts were found in Jordan, and no human schistosomiasis was found in Lebanon, though *Bulinus* was discovered. Intestinal disease was widespread in Saudi Arabia and was probably even more important than the urinary form. Schistosomiasis was already known to exist in Syria and Iraq. The dangers of irrigation schemes are mentioned.

BLAIR (p. 584) reports a survey of schistosomiasis in British West and East Africa, Nyasaland and the Rhodesias. In all the countries both *Schistosoma haematobium* and *S. mansoni* exist (except Gambia which has only *S. haematobium*), but the public health importance of schistosomiasis is not known [but see MAKAR, below]. Field surveys are needed, and the author gives advice on how they may be conducted. Children should receive priority in treatment, for which lucanthone is advocated; intensive intravenous antimony by the slow injection technique is becoming more popular and is the best treatment for *S. mansoni*. The author thinks that large bodies of water are not suitable for the snail hosts, and that pools and streams on lake shore areas modified by human activity are the important foci.

Between 1951 and 1955 4·7% of 14,000 specimens of urine examined in Lagos contained eggs of *S. haematobium*, but very few eggs of *S. mansoni*

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1957, v. 54. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

were found in 29,000 specimens of faeces (Okpala, p. 1201). Both *S. haematobium* and *S. mansoni* are widespread in Ghana but Edington (p. 1202), who examined biopsy records over a large number of years, concludes that they do not suggest that schistosomiasis was an important cause of morbidity, though in occasional cases it was the cause of death.

Both *S. haematobium* and *S. mansoni* were found by de Morais (p. 57) in a survey of part of Mozambique. *S. mansoni* was restricted to the central zone, but *S. haematobium* was widespread. A survey of the incidence of rectal schistosomiasis in Swaziland is reported by Eastman-Nagle (p. 59) who used rectal biopsy. He found *S. haematobium* in 29% of schoolchildren, *S. mansoni* in 3% and both in 4%. In older pupils *S. haematobium* was found in 51% of rectal biopsies but in only 6% of urines. Geographical distribution is also mentioned.

Makar (p. 365) has published a book on the urological aspects of schistosomiasis in Egypt. In a review Gelfand gives it high praise, and makes the remark that it conveys the impression that schistosomiasis is now perhaps the most serious disease with which the public health authorities have to deal in Africa.

Marks (p. 303) discusses the surgical sequelae of schistosomiasis as seen in the Central African Federation, mentioning the lesions found in bladder, ureter, alimentary system, appendix, and pelvic organs, and hepato-splenomegaly. Some details are given in the original abstract.

In a critical review of the treatment of schistosomiasis, Schneider (p. 972) states that there is no single drug which will ensure complete cure, and there is none which is both non-toxic and well tolerated. He gives a considerable list of drugs which have been used. Ritchken and Sanders (p. 180) note that sodium antimony tartrate remains the drug of choice for *S. mansoni* infections, but have found that intravenous anthiomaline is the best for *S. haematobium*.

Ozawa (pp. 1431, 1432) gives an account of the distribution and fate of antimony in the body of experimental animals after treatment with sodium antimony tartrate. Much detail is given in the original abstracts.

In *S. japonicum* infection the high fever and marked wasting do not resolve under antimony treatment, but Koang *et al.* (p. 587) found considerable benefit from the use of corticotrophin in such cases. Fu *et al.* (p. 587) observed basophilic stippling of the red cells in patients treated with tartar emetic for *S. japonicum* infections, but they do not regard this as of any serious pathological significance. T'Ao (p. 1206) gives an account of certain cardiac manifestations of the toxic action of potassium antimony tartrate in *S. japonicum* infection; ventricular fibrillation and the Adams-Stokes syndrome may occur, and may be fatal. Dao *et al.* (p. 1105) also report fatal Adams-Stokes syndrome in a patient treated with tartar emetic in the acute stage of *S. japonicum* infection.

The toxic symptoms of tartar emetic suggest a vagotonic action, and as the belladonna alkaloids are unsuitable as antidotes on account of their

own side effects, SALEM (p. 305) tried oxyphenonium bromide, which has an anticholinergic action. It was successful, particularly when given at the same time as the tartar emetic. LIANG *et al.* (pp. 455, 1208) found that the toxicity of tartar emetic for mice could be markedly reduced by simultaneous injection of procaine and some other drugs, and that procaine seemed to enhance its therapeutic activity. The same workers (p. 456) describe some of the routine procedures adopted in this work on experimental therapy. The toxic effect of tartar emetic in animals can be reduced by administration of BAL, BAL-glucoside or sodium dimercaptosuccinate, but LIANG *et al.* (p. 1208) note that its therapeutic activity is also diminished by these substances.

After a trial of 12 new compounds in experimental *S. japonicum* infection, CHU *et al.* (p. 1207) conclude that 2 (antimony) compounds were more effective than tartar emetic.

A case of thrombocytopenic purpura due to Fuadin is reported by RIVERA *et al.* (p. 311), and SCHICK *et al.* (p. 838) report a case of sudden death, in the course of treatment of schistosomiasis with Fuadin, and urge caution in its use.

HALAWANI *et al.* (p. 1097) used Miracil D in courses lasting over 20 days for the treatment of urinary and intestinal schistosomiasis in Egypt. In the urinary group about half or more were apparently cured, but the results in the intestinal group (both *S. haematobium* and *S. mansoni*) were not so good.

The schistosomicidal activity of diphenoxyalkane derivatives was investigated by CALDWELL and STANDEN (p. 313) and by STANDEN and WALLS (p. 313), and GORVIN *et al.* (p. 1431) refer to the activity of substances analogous to diaminodiphenoxyalkanes against *S. mansoni*.

In a survey of the snails of Egypt EL-GINDY (p. 1424) observes that *Biomphalaria boissyi* has a much more limited distribution than *Bulinus*, its greatest prevalence being in the triangle of the Delta. Its prevalence is directly related to that of *S. mansoni*.

SCHWETZ (p. 1092) gives an account of his collection of snail hosts of schistosomes from part of the Belgian Congo.

MCCLELLAND (p. 1094) reports studies on the snail hosts of schistosomes in Kenya, and their distribution, details of which should be sought in the original. He comments on the agricultural developments which are projected, and which involve the construction of dams which are essential for the utilization of the land. If means of preventing the spread of schistosomiasis are not found the benefits of agricultural development may well be nullified.

Experiments with *A. glabratus* and *Bulinus contortus*, in which the illumination of the aquaria was varied, indicated that *A. glabratus* is much more adaptable than *B. contortus* to darkness; DESCHIENS and BIJAN (p. 709) note that *A. glabratus* is frequently found in shaded habitats.

FRAGA DE AZEVEDO *et al.* (pp. 976, 1327) studied the phosphorus metabolism of various freshwater snails by means of radio-active phosphorus

and iodine, and they also determined the biological action of gamma radiation on snails.

Snail hosts of schistosomes, particularly *Bulinus* species, were found in all parts of the Zambesia Province of Mozambique by DE MORAIS (p. 1323).

WRIGHT (p. 585) comments on the importance of microhabitat for snail hosts of African schistosomes. The two important features are temperature and oxygen tension of the water, and this may be affected by vegetation. For instance, the leaves of the water lily may increase oxygen tension by causing diffusion of oxygen into the water immediately below them, so that there may be a layer of water providing a microhabitat particularly suitable for snails, and this may correspond to the tendency of miracidia to swim near the surface. In a discussion of factors affecting the susceptibility of snails to infection with various schistosomes WRIGHT (p. 973) lists them as physical (*p*H, darkness, etc.) and physiological (natural immunity, etc.).

CRIDLAND (p. 707) has continued his experiments with snails from East Africa bred in the laboratory and exposed to infection with the human schistosomes. He concludes that all the 10 species and subspecies of *Biomphalaria* known there are potential hosts of *S. mansoni*. The only species of *Bulinus* known in Uganda and incriminated as hosts are *B.* (*Physopsis*) *nasutus* and *B.* (*P.*) *globosus globosus*.

KLOCK (p. 59) describes an automatic dispenser for molluscicides in flowing water.

Two compounds which are insoluble in water, zinc oxide and methylic aldehyde, were tested by DESCHIENS and MOLINARI (p. 1103), and were found effective in the control of *A. glabratus* and *B. contortus* in the laboratory. They have a long-lasting effect and are used up very slowly, and they do not render water unfit to drink.

The molluscicides now available have disadvantages, and in Central Africa DE BONDT (p. 1324) has therefore investigated biological control. Partial control by ducks and toads is not highly practicable but a fish, *Haplochromis mellandi*, has been found which eats the relevant snails, including those which harbour a trematode parasitic on fish of the genus *Tilapia*. The use of *H. mellandi* may permit extension of fish culture and rice growing without the risk of increasing diseases transmitted through snails.

An account of the measures taken in Egypt to control schistosomiasis is given by HALAWANI (p. 1425). They include deliberate health education in the villages, sanitary measures, the care and treatment of irrigation canals, and mass treatment of infected persons with trivalent antimony compounds. Other helminth infections are also treated.

Schistosoma haematobium and S. intercalatum infections

The first focus of schistosomiasis to be recorded in Turkey is described by GÜRSEL (p. 582) who found *S. haematobium* in a place near the Syrian

boundary. WATSON (p. 449) gives an account of the schistosomes of man and animals, and their snail hosts, in Iraq, where *S. haematobium* is the only one affecting man, and *Bulinus truncatus* is its host. He (p. 1096) made detailed observations on the *Bulinus truncatus* population of a large drain near Baghdad, finding that the population was most dense where human pollution was high. He discusses the reason for this and speculates whether there is a biological mechanism whereby pollution with the excrement of a particular host normally favours the appropriate snail in the case of all species of schistosomes.

Urinary schistosomiasis is widespread in the palm groves surrounding the Sahara in Morocco, but GAUD (p. 583) states that it is not a major public health problem. It is largely a disease of children, who contract it while playing in water, and the author suggests that the construction of protected bathing pools might reduce the incidence. Mass treatment is not appropriate because no drug is free from toxicity and snail control in the irrigation canals would kill the fish and the people would not be willing to use water which appeared so obviously to be toxic. Investigations in Algerian irrigation channels showed that the materials of the canals, the form of outlet of reservoirs and the passage of water through pumping stations have no influence on the distribution of snails (notably *B. contortus*) in the canals, and that they may be distributed equally in systems with open-air and closed conduits under pressure. MARILL (p. 58) therefore argues that control should entail measures which make the establishment of colonies impossible, such as drainage of seepages and swamps, and measures to control any which occur by periodical treatment of the canal systems rather than by relying on control of distribution of the snails in the system. He (p. 1424) observes that *S. haematobium* is widespread in a district of the Upper Volta region of French West Africa; there is a vast area of endemicity in which certain localities show exceptionally high incidence.

S. haematobium infection is common in the Ke district of Ghana, where it is associated with the lagoons and swamps leading to the Volta, but not with the river itself. MCCULLOUGH (p. 301) notes that a species of *Bulinus* which corresponds closely to *B. sericinus* is experimentally capable of acting as host, and is apparently the only one. *B. forskali* is found but there is no evidence that it is a host.

ZAVATTARI (p. 585) has found evidence of urinary schistosomiasis in part of what was formerly Italian Somaliland, and of the snail *Physopsis globosa*. This is the first time the disease and the host have been identified there.

Urinary schistosomiasis has previously been reported from western India and the snail *Ferrisia tenuis* has been suspected as invertebrate host. GADGIL and SHAH (p. 302) have now exposed large numbers of these snails, bred in the laboratory, to the infection; they were found susceptible, eventually emitting cercariae which infected 1 of 4 white mice. In comment Standen suggests that as this is the first member of the

Ancylidae to be incriminated it is important to have a detailed description of the adult schistosome before it can be accepted as *S. haematobium*.

In a study of the egg output of *S. haematobium* in 2 volunteers, Stimmel and Scott (p. 705) found real differences between the output at night (low) and during the day (high). They discuss the possible reason for this, and the importance of the evaluation of a single specimen of urine for the clinician and the epidemiologist.

Pellegrino and Giudicelli (p. 1096) analyse the signs and symptoms found in young Africans infected with *S. haematobium*. Haematuria and albuminuria were important, and X-ray showed calcification in the bladder in one-third. Cystoscopy was also useful, and intravenous pyelography was regarded as indispensable for full investigation. Calcification of the bladder, ureters and seminal vesicles is a recognized complication of urinary schistosomiasis; Piganiol and Hervé (p. 179) found excessive crystalline deposits in the urine of Africans with this disease, and relate this fact to the calcifications referred to.

Paul (p. 305) reviews 200,000 chest skiagrams of Africans in Northern Rhodesia, and concludes that schistosomiasis does not cause specific abnormalities detectable on X-ray. Eggs of *S. haematobium* have been found in lung tissue but the lesions were too small to be detected radiologically.

Zahawi and Shukri (p. 970) report a case in which eggs of *S. haematobium* were found at autopsy in the heart muscle of a boy who had died of acute heart failure; there was evidence of focal necrosis round the eggs.

Nagaty *et al.* (p. 1203) report a patient with papular skin lesions, one of which was found to contain an egg of *S. haematobium*.

Rowland (p. 306) used trivalent sodium antimony gluconate for the intensive treatment of *S. haematobium* infection, reporting a cure rate of 83% in patients treated intensively for 120 hours, but only about 50% in those treated for 24 hours only.

TWSb (antimony dimercapto potassium succinate) is a complex trivalent antimony compound which does not adversely affect the cardiovascular system. Friedheim (p. 971) has used it successfully for *S. haematobium* infection, without serious side effects.

Trimble (p. 306) writes favourably of lucanthone in the treatment of *S. haematobium* infection in African units serving in Malaya.

As a test of cure after treatment of *S. haematobium* infection Rowland (p. 971) found microscopy of the urine more useful than hatching tests or rectal biopsy. He found that 76 of 100 patients were cured after treatment with sodium antimony gluconate.

In part of Tunisia Vermeil (p. 57) tried pentachlorophenate and phenylmercuric acetate for the control of *Bulinus contortus* in a stream and a pond; the acetate was the more effective, but it is less suitable than pentachlorophenate for sluggish waters.

A considerable amount of *S. intercalatum* infection was found by Schwetz (p. 1104) near Stanleyville in the Belgian Congo.

S. mansoni infection

Ferguson and Gerhardt (p. 711) describe the sexual apparatus of Planorbid snails of the Caribbean area, which may need to be differentiated from the hosts of *S. mansoni*.

Paraense (pp. 60, 1326) shows that in isolation a specimen of *A. glabratus* reproduces by self-fertilization, the spermatozoa being fully utilized, but that if another individual is present it does so exclusively by cross-fertilization, the foreign sperm being utilized in preference to the selfing sperm. By using albino snails of one species as markers, he and Deslandes (p. 60) showed that there was no cross-fertilization between *A. glabratus* and *A. nigricans*. The results of Paraense's work emphasize the role of geographical speciation in the development of *A. glabratus*, for in mixed breeding of specimens from widely separated areas there was lowered fertility.

In Puerto Rico *A. glabratus* is found in some slow streams, major aqueducts, pools along streams, marshes and ponds in limestone. It is absent from major reservoirs and certain other waters. Harry and Cumbie (p. 308) remark that schistosomiasis is not regularly transmitted in some areas where the snail occurs, but the reason for this is not known. The snail does not inhabit streams with a fall steeper than 20 metres in 1,000 metres, but gradient is only one of the factors involved; some organic enrichment of water is favourable to the snail, but streams from limestone and some other formations are unfavourable. This snail is largely absent from waters containing less than 150 p.p.m. dissolved solids, but Harry *et al.* (p. 1325) state that in these waters the concentration of copper salts tends to be relatively high, which may be the reason for the absence of snails.

In a series of experiments Chernin and Michelson (p. 1204) investigated the effects of crowding on the growth and fecundity of *A. glabratus*. The relationship remains obscure.

Olivier and Barbosa (p. 974) made seasonal studies on *A. glabratus* in Brazil, concluding that a small proportion survive the dry season, are capable of very rapid growth on return of the water, and produce a new generation. The life span of most snails is less than 1 year. Similar findings were made in a study of *Tropicorbis centimetralis* (p. 975). Barbosa and Coelho (p. 974) investigated the fate of larvae of *S. mansoni* in *A. glabratus* during the process of aestivation which the snail undergoes, and observed that if the snails had been infected shortly before aestivation began (not more than 25 days before) the embryo schistosomes were able to survive until the snails resumed their aquatic habit, but that if the infection was contracted earlier (over 25 days before) the embryos were killed early in the period of desiccation. Early larval development was only temporarily arrested by aestivation.

In an investigation of the possibility of acquired immunity in *A. glabratus* infected with *S. mansoni*, Barbosa and Coelho (p. 1327) found

some evidence of altered reaction on re-infection, but no evidence of effective immunity.

COUTINHO (p. 710) found that *A. nigricans* from São Paulo showed little susceptibility to *S. mansoni*.

A study of the genital organs of *Biomphalaria adowensis* and *P. pfeifferi* as a key to identification of the species is reported by FRAGA DE AZEVEDO and DE MEDEIROS (p. 969).

By means of a culture fluid of bovine amniotic fluid and other ingredients SENFT and WELLER (p. 450) were able to study the growth and regeneration of *S. mansoni* removed from infected mice. Details of this work should be sought in the original.

MOORE and SANDGROUND (p. 453) devised a method for estimating in hamsters the egg production of *S. mansoni* (300 eggs per day per female) and *S. japonicum* (3,500). Certain other differences were noted between these species. COKER and LICHTENBERG (p. 314) describe a method for the isolation of *S. mansoni* eggs from the livers of infected hamsters. A technique for concentrating miracidia is described by CHAIA (p. 1328).

A study of the enzymes of cercariae of *S. mansoni* has been reported by LEWERT and LEE (p. 451) which may have a bearing on the mechanism of invasion of the skin and the development of resistance by the mammalian host. Details should be sought in the original. STIREWALT (p. 838) describes the process of penetration of *S. mansoni* cercariae into the skin. The technique involved supravital staining of the cercariae. He relates his observations to those of previous workers.

A technique for freeze-drying cercariae of *S. mansoni* for the preparation of antigens is described by PELLEGRINO and NUNES (p. 1427).

PIFANO and RON PEDRIQUE (p. 1098) investigated the cercarial sheathing reaction of Vogel and Minning in *S. mansoni* infection, finding it positive in the fourth week, which was earlier than the intradermal reaction or the appearance of eggs in the faeces. In chronic infections the reaction was positive in 78%. It should be used for the routine diagnosis of the disease.

In a study of the effect of *S. mansoni* infection on the biology of white mice, DE MEILLON and PATERSON (p. 839) found that it affected weight increment, weaning and mortality according to dosage, but not litter size, and that a light initial infection provided protection against a later heavy infection. The implications of these findings are discussed. LURIE and DE MEILLON (p. 1101) studied the effect of repeated infections with *S. mansoni* in mice, and observed that a degree of immunity is produced which is indicated by the fact that fewer cercariae mature than after a single infection, and that the development of pathological changes is considerably delayed.

In mice infected with *S. mansoni* EVANS and STIREWALT (p. 839) observed an increase in the beta-gamma globulins of the serum, and a relative decrease in albumin.

DE WITT (p. 1205) infected with *S. mansoni* mice maintained on a diet

deficient in Factor 3, vitamin E and cystine, which produces liver necrosis and other lesions of various organs. Growth of the worms was stunted and no eggs were produced, and the infection did not result in the increase in serum gamma globulin which is usual in normal animals. The deficient mice harboured more worms than normal mice, indicating a diminution of natural resistance.

Details are given by SCHNEIDER and RADKE (p. 1329) of the preparation of a complement-fixing substance from *S. mansoni*.

RODRIGUEZ-MOLINA *et al.* (p. 712) found the circumoval precipitin test positive in 93% of 46 definite cases of *S. mansoni* infection.

In a test of the value of a cercarial antigen of *S. mansoni* for intradermal injection PELLEGRINO and his colleagues (p. 1328) found that there was no response to a concentration of 10^{-7}, but that with more concentrated preparations the response varied according to strength, and was more pronounced in older subjects than in younger persons. They (p. 1428) used a total extract and a polysaccharide fraction of cercariae of *S. mansoni* for an intradermal test, finding that the total extract gave the larger reactions. The polysaccharide fraction, therefore, is not the only active part.

Discussing Egyptian splenomegaly, KIRK (p. 1365) concludes that though there is a connexion with *S. mansoni* in a proportion of cases, there are others in which schistosomiasis is not found, and the aetiology is obscure.

In the *Anais Facul. Med. Univ. do Recife* (p. 1426) several authors describe studies on the pathology of *S. mansoni* infection. These can hardly be abstracted further; they are records of careful work.

COELHO (p. 711) discusses the importance of eggs of *S. mansoni* in pathogenesis, pointing out that the lesions they produce are primarily endovascular. The substances liberated by the miracidia lead to local tissue necrosis, reaction by histiocytes, and giant-cell formation.

SPINGARN *et al.* (p. 712) found rectal biopsy positive in 93%, and examination of faeces positive in 83%, of 106 persons with *S. mansoni* infection. Most of the biopsy specimens contained fewer than 50 eggs, and eggs were found in the stools of 7 persons negative to the biopsy test. The rectal mucous membrane appeared normal in 94% of the cases.

A case in which *S. mansoni* infection was found to resemble regional ileitis is reported by MYNORS (p. 586).

Intestinal schistosomiasis is widespread in the Yemen, and DI EGIDIO (p. 1429) gives an account of X-ray findings in this disease, details of which are given in the original abstract.

MARTINEZ-RIVERA and KOPPISCH (p 714) report pulmonary changes in 64·9% of 248 autopsies on patients with *S. mansoni* infection, but only in 3 were the lesions severe. Neurological complications are relatively rare, but PIGANIOL *et al.* (p. 181) report a case in a European infected in Madagascar, who showed hemianopsia and epileptiform seizures.

Areán (p. 309) cites 10 cases in which *S. mansoni* affected the male genito-urinary tract, which it rarely attacks.

Watanabe (p. 1206) has used needle biopsy of the liver for the diagnosis of *S. mansoni* infection; he considers the procedure safe, and much more effective in diagnosis than examination of faeces. Rodriguez (p. 713) compared schistosomal and non-schistosomal hepatomegaly in Puerto Rico, noting that portal hypertension and oesophageal varices were outstanding complications in the schistosomal cases. Liver function tests showed only moderate impairment in the schistosomal cases. Detailed findings should be sought in the original. In a study of the liver in *S. mansoni* infection, and a comparison with other affections, Boglioli (p. 977) concludes that the hepatic functions are less modified in schistosomiasis than in the other diseases studied, probably because in schistosomiasis there is no evidence that the hepatic cells are directly involved. Arafa *et al.* (p. 1099) measured the intrasplenic pressure in patients with fibrosis of the liver associated with *S. mansoni* infection, finding it raised in a large proportion of cases. Various techniques were used, including splenic puncture which carries risks in certain conditions, which are mentioned.

Ibrahim (p. 1430) found that ligation of the hepatic artery is safe in Egyptian splenomegaly; it has no effect on liver function but causes a marked fall in portal tension and has a very favourable effect on ascites. It should only be done when there is ascites. The spleen is not much reduced in size, and splenectomy is advisable when it continues to be a source of trouble. Khairy (p. 1431) refers to 13 cases in which ligation was performed with or without splenectomy; there were several deaths due to " burst abdomen " and bleeding, but no liver necrosis or failure.

Parodi *et al.* (p. 452) report favourably on a desoxybenzoin in the treatment of old-standing *S. mansoni* infection.

Certain ointments were proved by Hunter *et al.* (p. 61) to be fairly effective in protecting mice against cercariae of *S. mansoni*. Details are given and the compounds are to be tested on man.

Jove (p. 60) gives an account of the methods of application of molluscicides used in Venezuela. The most promising compound was copper pentachlorophenate, which was not irritating to the snails (as was sodium pentachlorophenate) and was effective. Copper ricinoleate is cheap and easy to prepare, and Gonçalves and Soares (p. 312) found it as immediately active as, and stronger than, copper sulphate and more lasting than pentachlorophenol or sodium pentachlorophenate. In experimental work Paulini and Pellegrino (p. 1103) found that copper sulphate was almost twice as lethal to *A. glabratus* infected with *S. mansoni* as to uninfected snails, and the same is true of sodium pentachlorophenate. This means that mollusicides may greatly reduce the number of infected snails even if complete kill is not achieved.

Michelson and Augustine (p. 1101) recall other work which indicated that some control of *A. glabratus* could be effected by the predatory activity of the snail *Marisa cornuarietis*, and they now find that this snail,

when kept in an aquarium with *Biomphalaria pfeifferi*, limits the numbers of that snail also. Adult *Marisa* do not destroy their own egg masses but devour those of *B. pfeifferi*.

S. japonicum infections

Mao and Lyu (p. 978) kept adult *S. japonicum* alive for up to 5·95 days (the longest period so far reported) in an artificial medium; for the first time development of immature schistosomes was observed in culture.

As a result of work with volunteers Hsü and Hsü (p. 314) conclude that the Formosan strain of *S. japonicum* develops for a short period in the viscera of man but does not reach maturity. It is a non-human, zoophilic strain.

Hunter *et al.* (p. 457) found that in experimental animals repeated exposure to cercariae of *Gigantobilharzia sturniae* produced an increase in sensitivity whereas *S. japonicum* did not. If exposure to *S. japonicum* was followed by exposure to *G. sturniae*, however, there was less reaction than with *G. sturniae* alone, but the nature of this immunological relationship is not understood.

Chung *et al.* (p. 181) made an antigen from the dried, ova-laden liver of rabbits infected with *S. japonicum*, and used it for an intradermal test. This liver-ova antigen proved more sensitive for the skin test than as an antigen for the complement-fixation test, though the latter was more reliable in determining the effect of treatment.

P'An *et al.* (p. 716) refer to the great value of rectosigmoidoscopy in the diagnosis of *S. japonicum* infection, and in the assessment of treatment. They give a detailed account of the appearances seen and the light they throw on the development of the disease.

Stransky and Reyes (p. 315) describe the liver changes in children infected with *S. japonicum* in the Philippines. Cytochemical studies on hepatic cells and other tissue elements of the liver infected with *S. japonicum* are reported by Sawada *et al.* (p. 454), and details are given in the original summary.

Pyloric obstruction and sigmoidal fistula are two complications of *S. japonicum* infection observed by Cheng and Ch'ien (p. 1104).

Chu (p. 1330) describes a number of cases in which carcinoma of the colon was found in association with *S. japonicum*. He believes that the association was not fortuitous, but was a factor in the malignant change.

Huang *et al.* (p. 1329) describe a condition of dwarfism which they associate with *S. japonicum* infection and which is possibly of pituitary origin, with deficient secretion of the growth hormone. Treatment with antimony produced marked improvement in some cases, and early treatment is advocated, to forestall irreparable physical changes.

Some value was found in certain dithiadihydrostibiol derivatives, in the treatment of mice infected with *S. japonicum* (Tsen *et al.*, p. 455).

Frick *et al.* (p. 315) show that Abbott's Insect Repellent Cream could

prevent *S. japonicum* infection in mice for limited periods of time after application.

Experiments with molluscicides applied in Japanese irrigation systems, for short periods on one or two occasions, indicated that if they can be used to reduce the snail population to the point of individual isolation, repopulation control against juvenile *Oncomelania nosophora* is feasible (Williams *et al.*, p. 1331).

Schistosome dermatitis

Hendricks and Cort (p. 840) investigated the action of antisera on cercariae of bird schistosomes *in vitro*, finding that with strong antiserum envelope formation takes place immediately and seems to have its origin in the fine extra-cuticular material present on the cercariae. With weaker antiserum the envelope does not form over the anterior end of the cercaria, and with the weakest antiserum no envelope forms, but profuse oral secretion occurs and becomes dispersed in the surrounding medium, and this is apparently responsible for the firm agglutination of the cercariae.

An account of the histopathology of the liver in mice experimentally infected with *Schistosomatium douthitti* is given by Kagan and Meranze (p. 1208).

Watson and Najim (p. 450) report schistosome dermatitis in Iraq, but were not able to identify the infecting cercariae, though infection with *S. turkestanicum* might have been responsible.

In the ricefields of part of Japan large numbers of people who are in contact with water develop cercarial dermatitis, which Oda (pp. 316, 317) ascribes to *Gigantobilharzia sturniae*, whose intermediate host is *Polypylis hemisphaerula*. He used copper sulphate, nitrolime and BHC with some success to control this infection.

After intradermal tests with antigens prepared from *S. mansoni* or *S. japonicum*, Hsü and Ameel (p. 316) conclude that persons with cercarial dermatitis of non-human origin rarely give positive reactions, and that skin tests for true infections with the human schistosomes are therefore not vitiated by previous exposure to the " non-human " cercariae.

Dermatitis due to *Austrobilharzia terrigalensis* is referred to by Bearup (p. 182), who describes its life cycle.

Other trematode infections

A detailed account of the pathology of *Clonorchis sinensis* infection of the liver is given by Hou (p. 62), who divides the histological changes into 2 groups according as to whether or not there is bacterial infection. Biliary obstruction is a common complication, and cholangitis, which is associated with bacterial infection, may result in multiple abscesses. Malignant change is one consequence of the disease. In a study of 200 necropsies of primary carcinoma of the liver in Hong Kong he (p. 979) found clonorchiasis in 46, and clear evidence of relationship between the

two conditions in 30. Every stage of cancer was present, and the type was mainly adenocarcinoma.

In part of Japan Murakami (p. 841) found larvae of *C. sinensis* encysted in the freshwater fish *Pseudorasbora parva*, the proportions infected varying from 2% to 93%.

In a few cases Basnuevo (p. 1105) found chloroquine apparently of some use in clonorchiasis. Chu (p. 1433) also used chloroquine in clonorchiasis with considerable effect, though one-third of his patients in southern China showed a return of eggs in the faeces within 12 months.

Chung *et al.* (p. 317) note that the complement-fixation test can be performed satisfactorily by the micromethod in paragonimiasis. They prepared a dried antigen from young or adult worms and with it tested sera and cerebrospinal fluids, finding the test very specific. Sera of patients with paragonimiasis, however, gave strong reactions with antigens from *Fasciola hepatica* and *C. sinensis* but not with a schistosome antigen, but cerebrospinal fluids did not react to these other antigens.

Lavier and Deschiens (p. 318) review the incidence in France of infections with *Fasciola hepatica* (usually acquired by eating contaminated watercress) and *Dicrocoelium dendriticum* (from eating the ants which are the second intermediate hosts). Bertrand and Faure (p. 457) refer to *F. hepatica* infection contracted from watercress in Morocco, and report 2 cases in which subcutaneous swellings, probably allergic, were observed. Ova were not found in these 2 cases, but the intradermal test with distome antigen was strongly positive.

F. hepatica infection is common in sheep and cattle in South Africa; 2 human cases are reported by Louw and Wilkie (p. 458), who suggest that the infection may be commoner than is suspected. de Meillon (p. 588) agrees with this and quotes a high incidence of ova resembling those of *F. hepatica* in mine recruits "from a certain coastal area".

Though *F. hepatica* infection is uncommon in children, Atias and Pesse (p. 459) report 2 cases in Chile. The patients were sisters and one of them did not show symptoms, but was diagnosed during the course of examination of the family of the first patient. The authors emphasize the importance of such family examination in these cases.

Rohrbacher (p. 843) has been able to maintain bacteria-free *F. hepatica in vitro* in solutions of various sugars and other substances; the fluke can absorb simple carbohydrates through its cuticle. Although it can survive in anaerobic solutions it is primarily an aerobic organism. Rowan (p. 981) has made a detailed study of the hatching of the egg of *F. hepatica*.

For experimental *F. hepatica* infection of rabbits Lämmler (p. 319) found hexachlorethane to be the drug of choice.

Fain and Vandepitte (p. 980) describe a new trematode, *Poikilorchis congolensis* n.g., n.sp., in subcutaneous retroauricular cysts in man in the Belgian Congo. This trematode has some resemblance to *Paragonimus*, and some cases of pulmonary involvement reported elsewhere as due to *Paragonimus* may in fact have been due to this new species.

Ch'in and Ch'en (p. 63) quote a case of cerebral paragonimiasis complicated by epidemic B encephalitis, and they think that the parasitic lesions in the brain favour the entrance of the virus after the blood-brain barrier is damaged. A high incidence of infection with larvae of *P. westermani* in crabs was found by Shigemi (p. 842) in part of Japan. Experimental infection was induced in cats, in which infection of the brain and other organs was observed.

Cestodes

Mazzotti and Méndez (p. 983) report very favourably on Diphenthane 70 (dichlorophen, an anthelmintic used for domestic animals) as a treatment for tapeworm infection of man. It is effective but appears to have little toxicity. In Kenya, where *Taenia saginata* is the common cestode, McKinnon (p. 844) treated a large number of patients with mepacrine, without serious adverse effects, and with good results in 90%. Jackson (p. 63) used dichlorophen on a number of volunteers, with some apparent success against tapeworms.

Arseni and Samitca (p. 1435) review 65 cases of cerebral cysticercosis seen in Bucharest in 20 years. Reddy *et al.* (p. 588) from India report 2 cases of silent cysticercosis of the brain. Two cases of cerebral cysticercosis in which treatment with diethylcarbamazine apparently produced considerable improvement are reported by Gallais *et al.* (p. 982).

Baer (p. 184) discusses the taxonomic position of *Taenia madagascariensis* which is identical with *Inermicapsifer madagascariensis*, which was found in 2 persons from Mauritius and seems outside Africa to have become adapted to man. It may have been introduced into the Malagasy region by creole labour from the West Indies.

Fain (pp. 460, 1107, 1108) describes for the first time the life history of *Taenia brauni*. The adult is common in the intestine of dogs and jackals in the Belgian Congo and the larval stage is found in various rodents. The young larvae invade the lungs of dogs and rodents, and this process, though well known in nematode infections, has not before been observed with cestodes. He describes 8 cases of human coenurosis due to this worm: the coenurus is found along the ribs, or elsewhere on the trunk.

Dungal (p. 1435) gives an account of hydatid disease in Iceland and the measures taken since the later part of the 19th century to control it by placing a tax on dogs, forbidding the feeding of entrails of domestic animals to dogs, and taking steps to reduce the incidence in sheep.

Myrseth (p. 320) discusses hydatid disease in the far north of Norway, where 10 cases have been reported in recent years. He suggests a survey by means of the Casoni test. Rein (p. 718) also refers to the probably high rate of hydatid disease in northern Norway.

Bailenger (p. 1106) refers to a very active focus of endemic echinococcosis in the Pyrenees, with an index of 5·3 per 100,000 people and indices of up to 40% in cattle, and less in sheep and pigs.

Hydatid disease is widespread in Turkey; Oytun (p. 1209) explains that

most cases are of the usual type, but the alveolar form does occasionally occur throughout the country.

In north-west Canada Wolfgang and Poole (p. 320) used an antigen from reindeer hydatid cysts for an intradermal test which revealed positive results in 31% of the people tested. The main animal reservoirs are probably the wolf, moose, elk, caribou and reindeer.

In New Zealand, country dogs are infected with *E. granulosus* to the extent of 10–60%, and hydatid cysts have been found in up to 90% of sheep, and in smaller numbers of other domestic animals. The disease is prevalent in man and McCarthy (p. 1437) suggests that most infections are acquired in childhood through "dirty fingers". Control measures are attempted, but the problem is immensely difficult in this sheep-farming country. Begg *et al.* (p. 1334) describe cases of cerebral hydatid cyst in man in New Zealand, and discuss prevention which should include legislation to keep dogs away from abattoirs and freezing works. In New Zealand most of the slaughtering is done on farms, and by tradition the liver is given uncooked to dogs. This should not be permitted, and each liver should be boiled for 30 minutes.

Hydatid disease in man is common in Chile, and Neghme *et al.* (p. 588) give an account of the 1,093 cases reported in the period 1953–54.

Lass and Nitzani (p. 719) note the great diagnostic value of the Casoni test in hydatid disease. An indirect haemagglutination test for hydatid disease is described by Garabedian *et al.* (p. 1335), who found it rather more sensitive than the complement-fixation test.

Rausch and Schiller (p. 845) and Rausch (p. 1333) have previously stated that they regard the newly described *Echinococcus sibiricensis* as the cause of alveolar hydatid disease in man. It is widely distributed in Europe and Siberia and on an island near Alaska. They name certain rodents which are susceptible to it, and note that man is not a favourable host, though the larvae do become established in some persons, and alveolar hydatid disease has now been reported on the Alaskan island. The Casoni test indicates that infection is fairly widespread, but a positive Casoni test with a negative complement-fixation test may indicate that the infection has been overcome. Dogs are important in spreading this disease, and eggs of the worm can withstand severe cold.

From a study of *Echinococcus alveolaris* from naturally infected foxes in Alaska, with which white mice were infected, Mankau (p. 460) concludes that the chief characteristic of its larval stage is the type of lesion, which behaves very much like an infiltrating neoplasm. Vogel and Schumacher (p. 1210) show that in experimental infection of field voles with *E. alveolaris* the brain and spinal cord may become infected, though this is rare in man. They think that where this does occur in man, the oncosphere is carried directly to the brain. A full account of the animal experiments is given.

Hanstein (p. 719) describes a patient with alveolar hydatid cyst who was treated (after laparotomy) with a preparation of thymol by injection

for several months. After early deterioration his condition improved very impressively and remained good.

In mice infected with *Hymenolepis nana* di-n-butyl tin dilaurate was found an effective treatment by Abdou (p. 1435) who puts the minimum effective dose at 0·00125 ml. per 20 gm.

Chandler and Pradatsundarasar (p. 1109) report *Raillietina* infection of infants in Thailand and discuss the taxonomy of the species found.

The essential cause of *Diphyllobothrium latum* anaemia seems to be deprivation of the host of vitamin B12 by the worm, and Nyberg and Östling (p. 183) found that the B12 concentrations in the serum were similar in this anaemia and pernicious anaemia, which tends to confirm the hypothesis.

Watson and Laurie (p. 183) report a case of cerebral coenurosis in a Bantu. From Kenya and Uganda Raper and Dockeray (p. 321) report 5 cases of coenurus cysts in man, and discuss the epizootic background of the infection, which may differ from that of South Africa. 3 of the 5 cysts were found in the eye in hitherto unrecorded sites, and Boase (p. 322) also records 2 infections of the eye in patients [possibly the same as those described above] from Uganda. A case of cerebral coenurosis is described by Wainwright (p. 1333) in an African who slowly became blind, and 4 cases of racemose cysts which may lead to hydrocephalus by interfering with the flow of cerebrospinal fluid. *Charles Wilcocks*

(To be continued)

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Sawada, T. **Postwar Malaria in Japan.** *Kyushu J. Med. Sci.* Fukuoka. 1957, Aug., v. 8, No. 4, 155–78, 18 figs. [13 refs.]

It is known that about 5·8 million people were repatriated to Japan after the war and that many had previous experience of malaria and suffered later relapse. By questionnaire and sampling processes it is estimated that 1·36 million repatriates came to expand the normal population of 10·47 million people in the Province of Kyushu and of these repatriates 10·1% had previously suffered from malaria and 4·1% later suffered recurrences. In the period under review there were also apparently 1,965 indigenous cases of which 10 proved to be due to *Plasmodium falciparum*, not previously believed to be transmitted in

Japan. The timing and season of these relapsed cases are analysed. Clinical findings on 106 persons examined are also recorded. The disease, once widely endemic in Japan, does not appear to be re-establishing itself. The potential carriers are reviewed; they include: *Anopheles hyrcanus* var. *sinensis*, *A. lindesayi* var. *japonicus*, *A. koreicus*, *A. edwardsi* and *A. sineroides*. The native *A. hyrcanus sinensis* is probably the carrier of such infection as occurs but it is not a potent one and partly for this reason the disease is dying out. *G. Macdonald*

Bertram, D. S., McGregor, I. A. & McFadzean, J. A. **Mosquitoes of the Colony and Protectorate of the Gambia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Mar., v. 52, No. 2, 135–51, 1 map & 2 figs. [38 refs.]

The present paper is a report on the mosquitoes collected in the Gambia chiefly in the rainy season of 1952 which, with the lists of mosquitoes from Senegal [this *Bulletin*, 1955, v. 52, 1148] and Casamance [*ibid.*, 1957, v. 54, 760], brings the mosquito list of the Sene-Gambia up to 89 species and varieties. The Gambia is on the north-western edge of tropical Africa and the area has a prolonged dry season from October to June. Most of the mosquitoes reared from larvae were collected in, or near, mangrove swamps, or from impermanent fresh water, such as water in canoes, water butts and other containers, flooded hoofprints and rice fields. *Anopheles gambiae*, which was found breeding in small pools and other small areas of fresh water, and *Anopheles gambiae melas*, which was associated with *Avicennia* mangrove swamps and particularly with growth of sea-purslane (*Sesuvium portulacastrum*), were the principal man-biting species. *Anopheles funestus* was rare in the villages of the lower Gambia but may be more important in the upper freshwater part of the river. 5 other species or varieties of *Anopheles* are also recorded. *Anopheles gambiae* and *melas* were numerous inside European houses and African huts, and also fed when disturbed in the mangrove swamps during the day. Out of 124 specimens collected in African huts approximately 75% had fed on man, and 8·2–11·6% had probably fed on man, or on monkey. The sporozoite rate at one village was 1·9% in 162 mosquitoes dissected, but no infected mosquitoes were found, out of 155 dissected, in another village where primary infections with malaria were found in infants. The corresponding infections with filariae found in mosquitoes dissected in the two villages were 4·9% and 2·3% respectively. *Culex pipiens fatigans* was found to be rare and the evidence suggests that *Anopheles gambiae* and *melas* are the vectors of filariasis in the lower reaches of the river. The authors point out that not all the larvae in infected mosquitoes can be confidently accepted as *W. bancrofti*. Gambian cattle are infected with *Setaria cervi*, and *Dirofilaria aethiops* has been found in monkeys. *Anopheles gambiae* females were taken feeding on cattle, and also on a tree platform 22 feet from the ground. Culicine mosquitoes were also

taken at the same time, and previous records of *W. bancrofti* from *Culex duttoni* and *Mansonia* may be due to misidentification of the worm larvae. *Aëdes aegypti* was found biting man and dog indoors and out-of-doors during the day. *Culex thalassius* and *Aëdes irritans*, as well as other Culicines, enter European houses and African huts at night, and *Aëdes irritans*, *A. albocephalus*, *A. punctothoracis* and an undescribed species of *Aëdes*, all were found biting viciously out-of-doors during the day.

[See also this *Bulletin*. 1957, v. 54, 527.] *B. R. Laurence*

Service, M. W. & Oguamah, D. **Colonization of** *Anopheles funestus*. [Correspondence.] *Nature*. 1958, Apr. 26, v. 181, 1225.

In 1954 attempts were made in Lagos, Nigeria, to colonize *Anopheles funestus*, the second most important vector of malaria in Africa, and were continued for 3 years. The first successful colony was established in 1955–56 from eggs of wild-caught *A. funestus* fed alternatively on human and guineapig blood. Egg production was small and of short duration and this colony died out in a few months.

Another colony was established in August 1957 from wild-caught gravid females maintained on guineapig blood only. This colony is now in its eighth generation and is remarkable for its vigour and egg production. The eggs are laid on filter paper in a dish of water and the larvae are maintained in bowls of tap water containing the floating weed *Elodea canadensis*. The larval food is pure dried yeast. The adults are kept in complete darkness in cages of 1 cu. ft. capacity; females are fed daily on anaesthetized guineapigs and males on a sugar solution freely available in the cage. The cycle from eggs to pupae lasts about 21 days at 80–85°F. A subsidiary colony was established successfully in London from 2 egg batches sent there by air. The taxonomy and bionomics of this colony are being studied. *H. J. O'D. Burke-Gaffney*

Brouwer, R. Geurverschillen bij de mens als oorzaak van interindividuele verschillen in attractie voor malariamuskieten. [**Odour Differences in Human Beings as a Cause of Differences in Attractiveness of Individuals for Malaria Mosquitoes**] [Thesis]. 110 pp., 5 figs. [Numerous refs.] English summary. 1958. Leiden: Rapenburg 13, Holland.

Experiments are reported in which mosquitoes (*Anopheles stephensi*) were given, by means of air-current olfactometers, simultaneous choice of 2 human hosts. The mosquitoes were bred in culture at 25°C. and 80% relative humidity, and 2- to 3-day-old unfed females were used in the tests. Over a period of 4 years, one culture was fed solely on the human arm ("A-mosquitoes") and another solely on guineapig ("Z-mosquitoes"). The author writes of these as the anthropophilic and

zoophilic strains, but emphasizes that this refers only to this experimental differentiation and not to any natural differences of this kind in initial material.

Differences in the attraction of different human beings to the mosquitoes were always slight. Refinements of the apparatus, experimental design and statistical treatment of the data have been essential. Factors eliminated from the comparisons were the colour, structure, movement, shape and sight of the test subject (the person's arm). Radiation, convection heat and relative humidity differences were nullified. Carbon dioxide content of the air stream over an arm was less than 0·01% higher than in fresh air; it is concluded that carbon dioxide was not an important factor in the difference of attractiveness of 2 persons.

The final conclusion is that the difference between 2 persons depends on differences (quantitative or qualitative) in their sweat, and "other factors, such as 'blood smell', specific body odour etc.". The "A-mosquitoes" and the "Z-mosquitoes" made the same choices between 2 human hosts; but there was evidence of the "Z-mosquitoes" being less readily activated than the man-fed strain. The mosquitoes showed sufficiently satisfactory activity to allow of tests from 9 to 12 hours and again from 19 to 24 hours. Repeated testing induced fatigue in the mosquitoes with diminished response, even with at least half an hour between 5 successive tests.

It is indicated that these investigations may be extended by means of a new experimental design with improved statistical analysis. The design and circuits of the two types of air-current olfactometers used are shown in line drawings and results are given in numerous tables and by graph. The English summary is thorough. *D. S. Bertram*

Laird, M. **Studies of Mosquitoes and Freshwater Ecology in the South Pacific.** *Roy. Soc. New Zealand Bull. No. 6.* 1956, Jan., 213 pp., numerous illustrations. [Numerous refs.]

In an attempt to analyse the factors which limit the distribution of anopheline mosquitoes in the Pacific area eastward of longitude 170°E., and from some islands to the west of that line, the author describes the results of a survey of potential anopheline breeding grounds in Queensland and in the island groups of the Solomons, New Hebrides, New Caledonia, Loyalties, Fiji, Tonga, Western Samoa and representatives of the Cook, Gilbert, Ellice and Tokelau groups.

A standardized sampling technique was used and both larva-carrying and larva-free habitats were graded into 12 types. As well as noting the abundance of mosquito larvae, attention was also given to other plants and animals in the habitats, with particular reference to small forms that either provide food for larvae, such as euglenid flagellates and rotifers, or are inimical by competing with mosquito larvae or by preying on them. In this way 372 habitats were found which harboured mosquito larvae

and 85 which did not. A comparison was also made between the habitats of anophelines in the western part of the area and adjoining areas, apparently comparable ecologically, which were free of anophelines.

The data on the 457 areas examined are presented in tables covering 32 pages and the ecological factors, in coded form, given in each case as well as the species of mosquitoes found there. In the succeeding pages the occurrence, frequency and distribution of other organisms in the habitats examined, totalling 29 orders and including the Protozoa, Coelenterata, Annelida, Crustacea, Insecta, Mollusca and Pisces and Amphibia, are discussed in greater or lesser detail.

A section is also devoted to parasites and commensals associated with mosquito larvae and the author describes two new parasitic species of fungus in the genus *Coelomomyces* Keilin (1921), which he names *solomonis* and *cairnsensis*. Later on, in deriving his conclusions and discussing possible control methods, the author considers that there is a case for trying the effect of *Coelomomyces stegomyiae* on previously unexposed populations of *Aëdes polynesiensis* in the remote Nukunono and Tokelau Islands.

In discussing factors affecting the distribution of anophelines in the South Pacific the author starts by considering the anopheline-free islands in those groups, such as the Solomons and New Hebrides, that are generally malarious in most of their number. At Bellona in the Solomons, where *Anopheles farauti* and malaria were known to have occurred, there was no malaria at the time of the author's visit and no anophelines found breeding, a fact which he attributes to the absence of surface water, but considers that container breeding by this species, which could occur, would never support more than a small population. Tutuba in the New Hebrides, however, was thought to be free of *A. farauti* by reason of the fact that its only standing water was covered by duckweed. Futuna Island on the other hand, situated within easy reach of the malarious island of Aneityum, had breeding grounds that appeared suitable for *A. farauti*, but in this case the fact that ships calling at the island have to anchor well off-shore and the island itself has a cliffed coastline was thought to prevent mosquitoes reaching breeding places. In this way the various factors which may be limiting the establishment of anophelines in islands neighboured by others not so fortunate are closely analysed.

The decrease in the number of culicines, as well as the absence of anophelines, was noticed by the author to go hand in hand with a general reduction of flora and fauna as one moved eastward. In spite of the presence of apparently suitable habitats, Buxton's line in fact merely represents one step in the falling-off process affecting many species which can be explained as the result of isolation.

As well as emphasizing the need for a stepped-up campaign against anophelines in the westerly part of the region (in some areas of the Solomons and New Hebrides for instance, mosquito control has fallen off rather than improved since the war), the author makes the point that new

agricultural measures may, in some cases, favour the formation of suitable breeding places where none existed before; the introduction of the sweet potato (*Ipomoea aquatica* Forsk.) is mentioned in this respect.

The detailed study which Dr. Laird has undertaken and his careful analysis of the data, covering as it does such an important and often neglected aspect of mosquito ecology, will be particularly valuable to culicologists working in the South Pacific and certainly not without value also to the fresh-water biologists. The only faults one can find concern those of publication; a long list of errata is required, and the colour photographs have not reproduced well and would have been of more value in black and white. *E. R. Nye*

Henry, A. F. X. Propos sur l'expertise des paludéens. Bases médico-biologiques. Valeur de la sérologie. [**Medico-Biological Basis for the Diagnosis of Malaria. Value of Serological Methods**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 770–77. Discussion 777–80.

The author summarizes methods in use for the diagnosis of acute and chronic malaria, paying particular attention to his own melano-flocculation test, which he stresses is important for (a) diagnosis of apyrexial cases, (b) the checking of therapeutic cure, (c) detection of chronic malaria in blood donors, (d) indicating the hidden presence of malaria in certain tropical syndromes [see this *Bulletin*, 1954, v. 51, 7], and (e) medico-legal assessments (such as liability for disablement pension as a result of chronic malaria).

In the discussion following this paper both J. Schneider and M. L. R. Montel stress the necessity of demonstrating parasites in the blood in order to accept a diagnosis of chronic malaria for pension purposes; the latter cites the following figures for the persistence of malaria: *Plasmodium praecox* (= *falciparum*) 3 years, *P. vivax* 5 years and *P. malariae* possibly 50 years. Henry replied by emphasizing the high degree of *splanchnotropisme* shown by some strains of parasites when serological reactions alone will provide a clue to diagnosis. [While one would always prefer to find the parasite, and perhaps to accept this standard alone in one's own practice, it is difficult to ignore Dr. Henry's point of view based on a long lifetime's devotion to the subject.] *P. C. C. Garnham*

Halawani, A. & Shawarby, A. A. **Malaria in Egypt (History, Epidemiology, Control and Treatment).** *J. Egyptian Med. Ass.* 1957, v. 40, No. 11, 753–92. [21 refs.]

A full review is given of malaria in Egypt including its history, the anopheline fauna with a key for the identification of species, descriptions in full of the two carriers, *Anopheles pharoensis* and *A. sergenti*, and an

account of the various programmes of control taken from 1900 to the present time. Pre-war surveys showed parasite rates of 6·3% and 3·6% in lower and upper Egypt respectively and in 1953 these had dropped to 0·2% and 0·04%. The original Anti-Malaria Commission, after founding a malaria control and research station, led to the establishment of a malaria section in the Ministry of Health in 1936, which temporarily expanded into the Gambiae Eradication Service in 1944 and 1945. It then reverted to its previous position and is now aided by a section of the Endemic Diseases Department called the Mass Treatment and Control Services for Endemic Diseases.

Control has been largely by improvement in drainage, superimposed on which there has been a considerable number of special campaigns, many of them very large in size, devised for the solution of particular problems. The first was the Gambiae Eradication Service [see this *Bulletin*, 1949, v. 46, 438]. This led to the campaign for the eradication of *A. sergenti* from the Dakhla and Kharga oases by larvicidal DDT augmented by its imagicidal use when there was a small introduction of *A. sergenti* in 1951. Malaria was later virtually eradicated in the Siwa oasis by imagicidal DDT but without eradication of the vector. In the Bahariya oasis reliance was placed on the use of drugs to control the disease and in the Fayum imagicidal DDT has been the chief tool.

The potential value of drugs in the mass control of malaria has been particularly studied and it is considered that a 1-dose treatment of 0·6 gm. of either chloroquine, amodiaquine or proguanil gives a satisfactory cure rate for this purpose. A general eradication campaign largely based on the use of drugs with restricted imagicidal practice is recommended.

G. Macdonald

Meyus, H. & Bervoets, W. La lutte anti-paludique dans la plaine de la Ruzizi: 1952–1957. [**Malaria Control in the Ruzizi Valley, Ruanda-Urundi from 1952 to 1957**] *Riv. di Parassit.* Rome. 1958, Jan., v. 19, No. 1, 29–46, 4 graphs.

Ruzizi is a plain in Ruanda Urundi at an altitude of 800 to 1,000 metres, with a population of 40,000 people, and with a fairly dry tropical upland climate. *Anopheles gambiae*, depending largely on man-made breeding places and shelters, is the main malaria carrier, strongly reinforced by *A. funestus*, breeding in swamps below 900 metres. It is possible that *A. pharoensis* may also have an influence and the anopheline fauna includes *A. coustani*, *A. squamosus*, *A. marshalli*, *A. maculipennis* and a few rare *A. christyi*. A brief account is given of the local ecology of each. Malaria is perennial and moderate with pre-control parasite and spleen rates of 45% and 28%. *Plasmodium falciparum* predominates with very few *P. vivax* and *P. malariae*. Control started in 1952–53 with a survey and two experimental applications of DDT. It has continued from 1954–57 with one annual application of 2 gm. per sq. metre of DDT to

normal house resting places and, for the first 2 years, a considerable anti-larval campaign. The subsequent malariometric data show among other things that the infant parasite rate which was 49% in 1952 declined progressively to 2·5% in 1957 while the malaria carriers have become very infrequent. Resistance to DDT has not been seen, though fear of it led to discontinuation of larvicidal practice. These good results have been limited only by the close association of Ruzizi with other uncontrolled areas whence there is a very large migration of people leading to the constant re-introduction of the disease. *G. Macdonald*

Nigeria, Northern: **Malaria Control Pilot Project in Western Sokoto. Third Annual Report 1956-1957** [Bruce-Chwatt, L. J., Archibald, H. M. & Haworth, J.]. 55 mimeographed pp., 7 figs. on 7 pls. **With an appendix on Investigations on the Chemistry of Insecticides** by D. M. Langbridge. 16 mimeographed pp. 1958, Jan. Yaba: Federal Malaria Service, Lagos.

The previous annual report on this scheme [this *Bulletin*, 1957, v. 54, 123] covered the time when *Anopheles gambiae* was found to be resistant to dieldrin. The present one covers events from March 1957 when the effects of resistance on the programme were fully evident, and remedial measures were known to be inadequate. The problems of supply had then made it impossible to do anything except substitute BHC for dieldrin in the zones of resistance and it was at first not even known that there was a cross resistance to BHC. The scheme was also in process of enlargement from a pilot project to a mass malaria control campaign intended, with the existing scheme, to protect about half a million people.

Findings are given in meticulous detail; spleen and parasite rates analysed by ages show incontrovertibly that the transmission of malaria continued in the populations of all the test areas, and the inoculation rate in them is estimated to be about half that in the check area. Entomological observations demonstrate the continued prevalence of *A. gambiae* and *A. funestus* in zones protected by DDT, BHC and dieldrin, though in smaller numbers in the DDT zone than elsewhere. It is notable also that no infective anophelines were found in the DDT areas whereas the sporozoite rate in the BHC and dieldrin zones was very similar to that in the check area, though the lower density of anophelines in that area resulted in a lower average infective anopheline density. The resistance previously discovered has been further analysed and its spectrum studied. The technique of discriminating doses has been applied and resulted in the detection of the gene of resistance in some areas where insecticides had not yet been used. A further major focus of resistance to the dieldrin group was discovered in the neighbourhood of Kano.

Langbridge supplies a note on investigations of the chemistry of insecticides, particularly studies on the technique of assessing the dosage applied to walls and on the nature of sorption. Analysis of superficial scrapings

of the wall and of test papers applied to it indicated doses which were very similar to those calculated from the amount of insecticide used and the areas of the walls treated, there being little preferential advantage in either of the methods. Recoveries from thatch were, however, small—about 20% of that applied. Repeated application of DDT appeared to give some accumulation in the wall whereas this was not noted with dieldrin. Analyses of the persistence of normal dieldrin dispersal powder and one incorporating a resin indicated no resistance to sorption by the latter. *G. Macdonald*

Sharma, M. I. D. & Krishnamurthy, B. S. **Studies on the susceptibility of *A. subpictus* Grassi, 1899 to Chlorinated Hydrocarbon Insecticides in a Delhi State Village.** *Indian J. Malariology.* 1957, June, v. 11, No. 2, 231–7.

"Studies on the susceptibility of *A. subpictus* adults to chlorinated hydrocarbon insecticides and *A. subpictus* larvae to DDT from a Delhi State village, sprayed with DDT since 1947, are recorded.

"*A. subpictus* adults were found to be highly resistant to DDT, but they did not show any cross resistance to gamma BHC and dieldrin.

"Fourth-instar larvae, obtained from the eggs of resistant *A. subpictus*, also showed appreciable tolerance to DDT."

Bray, R. S. **Studies on Malaria in Chimpanzees. V. The Sporogonous Cycle and Mosquito Transmission of *Plasmodium vivax schwetzi*.** *J. Parasitology.* 1958, Feb., v. 44, No. 1, 46–51, 2 figs. [10 refs.]

Bray has reduced to infra-specific rank *Plasmodium vivax schwetzi* as the result of observations on the sporogonic cycle of the parasite with which he successfully infected *Anopheles gambiae* from 2 chimpanzees. The first animal was splenectomized and an occult *schwetzi* infection quickly swamped a scanty *P. malariae* parasitaemia; mosquitoes were fed on the animal when microgametocytes were numerous and oöcysts and sporozoites developed. The latter were inoculated into a second chimpanzee (previously treated with chloroquine and primaquine), which after a prepatent period of 18 days developed a heavy infection and at this time further mosquitoes were infected.

The details of sporogony are described. The oöcyst grows from a size of 11 μ at 3 days to 61 μ at 10 days when it is mature (at a temperature between 75°–80°F.). The pigment became invisible during the 6th to 8th days of development; it was indistinguishable from that of *P. vivax vivax*. The infection rate was 38%; a microsporidian infection in the mosquito colony detrimentally affected the development of the oöcysts and in microsporidia-free mosquitoes the rate was 62%. The sporozoites were quickly destroyed in *A. gambiae*, and infections in the salivary glands were

light and transitory; for this reason it is concluded that *A. gambiae* is not the natural vector of the parasite. The large size of the oöcyst of *schwetzi*—61 μ—as compared with 50 μ of *vivax*, confirms RODHAIN's observations [see this *Bulletin*, 1955, v. 52, 956]; nevertheless Bray thinks that the difference is so small that *schwetzi* should be relegated to infraspecific rank.

[For earlier studies in this series, see *ibid.*, 1958, v. 55, 253.]

P. C. C. Garnham

BRAY, R. S. **Studies on Malaria in Chimpanzees. VI.** *Laverania falciparum*. *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 20–24. [23 refs.]

[The abstracter has already heard many criticisms of Dr. Bray's use of the name "*Laverania falciparum*"; its taxonomic justification is provided by what one hopes is the final ruling on the complicated question of the nomenclature of the malaria parasites where it is stated that the parasite of malignant tertian malaria may be placed under the generic name of *Laverania* by authors who consider this parasite to be generically distinct from the quartan malaria parasite (*Opinions and Declarations rendered by the International Commission on Zoological Nomenclature*, 1954, v. 7, Para. 281 (9) b), while its biological and morphological justification is provided by the many differences which distinguish this parasite from the other human forms. No doubt in non-zoological contexts the name *Plasmodium* will continue to be used by everyone, as it will be by those people who consider that the differences are too small to justify generic distinction. The application of specific names is governed by the most rigid rules; allocation to the higher taxa is necessarily more subjective.]

2 young chimpanzees were infected with sporozoites of *Laverania falciparum* derived from *Anopheles gambiae* which had been fed on 2 Liberians harbouring the gametocytes of the parasite. In the first chimpanzee, no pre-erythrocytic schizonts were found in a piece of liver taken 5 days after infection; 8 days later the animal was splenectomized and after a further 2 days parasites appeared in the blood and rose to a high density, particularly during the recrudescences—the erythrocytic parasites included rings and schizonts (with 28 merozoites), and immature gametocytes. In the second chimpanzee, pre-erythrocytic schizonts were found in the liver on the fifth day, a few on the eighth day and none on the twelfth day after infection, while tiny rings (which rapidly disappeared) flooded the blood $6\frac{3}{4}$ days after infection. The 5-day-old pre-erythrocytic schizonts were ovoid in shape, about 30 μ in diameter and corresponded to the 4-day-old forms described by SHORTT *et al.* [this *Bulletin*, 1951, v. 48, 701] and JEFFERY *et al.* [*ibid.*, 1953, v. 50, 672]; the 8-day-old schizonts were nearly mature, but only one showed the lobose arms described by the earlier workers.

L. falciparum thus differs from the chimpanzee's own *L. reichenowi* in its inability to develop in erythrocytes in animals with intact spleens, the apparent inability of gametocytes to attain maturity, and in the number of merozoites in erythrocytic schizonts in splenectomized animals (28 instead of 12). Pre-erythrocytic schizogony of *L. falciparum* lasts about a day longer in the chimpanzee than in man (6½ as compared with 5½ days). The failure to find schizonts in the liver 12 days after infection confirms the absence of an exo-erythrocytic cycle in this parasite, and the author redefines the genus *Laverania* on this basis, ignoring the morphological one which depends on the shape of the gametocytes. [Bray refuses to accept the help of the latter criterion because gametocytes of crescentic shape are present in certain malaria parasites of birds and reptiles; these, however, belong to different genera and are in nucleated corpuscles, and it would seem to the abstracter unwise to forgo the use of a sound morphological character which serves to distinguish the mammalian species.]

P. C. C. Garnham

Verain, Alice & Verain, A. *Plasmodium berghei* et Rayons X. [*Plasmodium berghei* **and X-Rays**] *C.R. Soc. Biol.* 1957, v. 151, No. 6, 1164–6.

36 rats were exposed to X-rays under various conditions to see how this procedure influenced the course of *Plasmodium berghei* malaria. 14 rats received 100 r for 3 days and were inoculated at the same time—the parasitaemia was unaffected and all the rats died; 6 rats received 250 r 4 hours after inoculation—a mild parasitaemia followed; 7 rats received 500 r 4 to 7 hours after inoculation—a general diminution or even abolition of parasitaemia ensued; 3 rats received 500 r twice at 8 days interval and were then inoculated—parasitaemia was unaffected; after other late exposures the parasitaemia was again unchanged. These experiments were all accompanied by observations on unradiated rats, and by comparisons of the reticulocyte count, which in irradiated animals showed a rapid initial fall, then a rise during the course of the malaria. Citrated blood infected with *P. berghei* was irradiated with doses up to 2,000 r, and was then inoculated into rats and mice, which responded in the ordinary way. Thus the effect of X-rays must have been on the animal and not on the parasite [see also this *Bulletin*, 1953, v. 50, 679].

P. C. C. Garnham

Cox, H. W. **Observations on Induced Chronic** *Plasmodium berghei* **Infections in White Mice.** *J. Immunology.* 1957, Dec., v. 79, No. 6, 450–54.

Plasmodium berghei is usually fatal to white mice [this *Bulletin*, 1952, v. 49, 670], but the author here shows that if the infection is treated with

atabrine [mepacrine], a certain number survive and acquire an immunity to the parasite. He used Swiss males 12 weeks old and gave them standard amounts of *P. berghei* in heparinized blood. A week later they were inoculated intraperitoneally with a solution of atabrine; a dose of 5 mgm. proved lethal, but 0·5 mgm. was sufficient to suppress the parasitaemia for 5 days, when a second dose of 0·5 mgm. was given. Parasitaemia kept at a low ebb, with occasional outbursts (so-called "relapses") which occasionally proved fatal; by the 51st day 12 of the original 20 mice were still alive, 8 with chronic infections. 100 days later, the infection was still present, but 140 days later, 4 mice were killed and were found to have lost their infections. The parasite of chronic infections retained its normal virulence as shown by subinoculation into white mice. 8 mice treated with atabrine were challenged 12 days after their original infection and survived for more than 55 days. Thus the use of atabrine allows the development of a state of acquired immunity to *P. berghei* malaria in white mice. *P. C. C. Garnham*

Serguiev, P. G. & Demina, N. A. **Studies of Immunity to** *Plasmodium berghei* **Infection. I. The Transmission of Acquired Immunity against** *P. berghei* **from Female Rats to their Offspring.** *Indian J. Malariology.* 1957, June, v. 11, No. 2, 129–38. [Numerous refs.]

The object of the investigation described in this paper was to determine whether immunity acquired by female rats to *Plasmodium berghei* was transmitted to their offspring. Experiments were carried out on 78 young rats (aged from 10 to 20 days) which were inoculated with 1,000 to 200,000 parasites per 20 gm. body weight.

Of the 40 animals which were born from hyperimmunized mothers only 1 became infected, while the 38 young rats born from normal control females fell into 2 groups. In one the majority (14 out of 15) became heavily infected, and it was shown that their mothers were also highly susceptible to infection with this parasite. In the other group most of the animals (16 out of 23) resisted infection, while the others (7) developed acute infections: the mothers of these rats also proved to be resistant. From these experiments it was evident that the susceptibility of young rats to infection with *P. berghei* was determined by the immunity of their mothers.

Further experiments were conducted to ascertain the part played by the mother's milk in the maintenance of the immunity acquired from her. Of 11 young rats born from immune females, 6 were transferred 2 days after birth to be suckled by normal foster-mothers. When inoculated 8 days later, none of the 11 rats became infected. They were re-inoculated 16 days later, with the following results: none of those which were suckled by immune females became infected, but among those suckled by normal females 4 were positive. Thus, the resistance of the offspring of an

immune mother persisted longer when suckled by her than when suckled by a normal female. *C. A. Hoare*

Fabiani, M. G. & Orfila, J. Résistance naturelle du lapin à l'infection expérimentale par *Plasmodium berghei*. Analyse des facteurs immunologiques. [**Natural Resistance of Rabbits to Experimental Infection with** *Plasmodium berghei*. **Study of the Immunological Factors**] *Ann. Inst. Pasteur.* 1958, Apr., v. 94, No. 4, 428–34. [12 refs.]

The authors, in a series of ingenious experiments, demonstrated the nature of the innate immunity which the adult rabbit exhibits to *Plasmodium berghei* (strain Kb 17). They first confirmed that the adult rabbit was immune even if splenectomized or rendered anaemic (with reticulocytosis) by repeated bleedings; they confirmed also that the baby rabbit (aged under 24 hours) is susceptible to infection. Was the immunity in the adult due to a humoral factor or to a lack of receptivity of the erythrocytes ?

The existence of humoral immunity was proved by (1) inoculating 8 mice and 2 rats with 1 cc. of adult rabbit serum and noting the prolongation of the incubation period of *P. berghei* after infection with this parasite, and (2) treating 10 infected mice with 0·5 cc. of adult rabbit serum daily and observing a diminution in parasitaemia among 7 of them, and (3) *in vitro* exposing infected mouse blood to adult rabbit serum in an incubator at 37°C. for one hour and seeing gross morphological changes in the parasites which became non-infective.

The cellular factor was studied by setting up what was in effect a culture of parasites, by rendering the peritoneum of mice impermeable (or closed) to *P. berghei* after preliminary treatment with normal blood, and then introducing into such a peritoneal cavity a mixture of marked adult rabbit erythrocytes (chiefly reticulocytes) and infected mouse corpuscles (no reticulocytes). In 9 mice prepared in this way, invasion of the rabbit corpuscles was shown to occur within 3 to 18 hours to the extent of 1%. The fact that rabbit corpuscles were invaded was confirmed by exposing the mixture to anti-mouse serum and observing the absence of haemolysis in the infected rabbit's cells. The rabbit's erythrocytes are thus shown to be receptive to this parasite, and it is the humoral factor which renders the animal resistant. *P. C. C. Garnham*

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African*—human, animal;* American*—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Ashcroft, M. T. **The Polymorphism of *Trypanosoma brucei* and *T. rhodesiense*, its Relation to Relapses and Remissions of Infections in White Rats, and the Effect of Cortisone.** *Ann. Trop. Med. & Parasit.* 1957, Sept., v. 51, No. 3, 301–12, 3 figs. [26 refs.]

Up to the present the nature of polymorphism in trypanosomes of the *brucei* group has remained unsolved. The author describes experiments and observations designed to throw light on this problem. His work was carried out with a number of recently isolated or cyclically transmitted strains of *Trypanosoma brucei* and *T. rhodesiense*, in which the course of infection was studied by daily counts of the trypanosomes in the blood, while the percentage of slender and stumpy forms was estimated in stained films.

It was found that during a rise in parasitaemia slender forms were predominant, but as parasitaemia decreased they were replaced by stumpy forms. It is suggested that this succession of forms is determined by immune reactions of the host as follows: the trypanosomes are slender during the period of infection preceding the production of antibodies; when the latter make their appearance, they inhibit the division of the slender forms and bring about their transformation into stumpy forms, which do not multiply and are eventually destroyed. This effect of the antibodies is supported by experiments showing that injection of cortisone into infected rats led to a prevalence of slender trypanosomes. The author believes that the stumpy and slender trypanosomes in the polymorphic species are not sharply demarcated but are connected by a transitional stage represented by the " intermediate " forms.

The results obtained by the author are shown in detail in a number of tables and graphs. *C. A. Hoare*

Polge, C. & Soltys, M. A. **Preservation of Trypanosomes in the Frozen State.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 519–26. [22 refs.]

A description is given of methods of preservation of trypanosomes by freezing. The following species were used in the experiments: *Trypanosoma brucei* (3 strains), *T. rhodesiense*, *T. gambiense* and *T. congolense*. The standard procedure was to bleed an infected mouse (1–2 ml. blood) into 8 ml. of Alsever's solution containing 10% horse serum, after which the red cells were sedimented by centrifugation (500–1,000 r.p.m. for 2–3 minutes), leaving the trypanosomes in a clear solution; the supernatant fluid was then transferred in the proportion of 1:1 to Alsever/serum with

or without glycerol, the final concentration of the latter ranging from 5 to 20%. Finally, 0·5 ml. quantities of this fluid were dispensed in test-tubes, which were sealed in a gas burner. Three freezing methods were used: (a) a quick one, when the tubes were transferred from room temperature directly to −79°C. (solid CO_2 + absolute alcohol); (b) a two-stage one, when the tubes were first kept at −15°C. for 2 minutes (in alcohol cooled with solid CO_2) and then transferred to −79°; (c) a slow one, when the tubes were placed in alcohol at room temperature, then cooled with pieces of solid CO_2, first by 2° per minute to −20°C., then by 5° per minute to −79°C. The frozen specimens were stored in vacuum jars containing the freezing mixture, which in their turn were kept in an insulated chest with solid CO_2. When removed from storage, the tubes were thawed in tap water at 15–20°C. The trypanosomes were examined microscopically for mobility and inoculated into mice to test for pathogenicity.

The results, which are described in detail and shown in tables, were as follows. When stored at −79°C., up to 90% of the trypanosomes of all species examined survived for 8 months, without losing their virulence and other properties. Glycerol (10%) exerted a protective action, especially at temperatures between −20° and −40°C., but the period of survival of the trypanosomes at these temperatures was shorter than at −79°, *viz.*, 2 weeks at −40° and 1 week at −20°, whereas in the absence of glycerol the survival time at these temperatures was 3 and 1 days respectively. *C. A. Hoare*

JORDAN, A. M. **The Mating Behaviour of Females of *Glossina palpalis* (R.-D.) in Captivity.** *Bull. Entom. Res.* 1958, Mar., v. 49, Pt. 1, 35–43, 1 fig. [11 refs.]

"Experiments were carried out in the laboratory with individually marked females of *Glossina palpalis* (R.-D.); various aspects of their mating behaviour, when placed with virgin 7-day-old males, were studied.

"Using virgins, females 1–3 days old mated for an average period of about two hours, females 4–9 days old for about 75 minutes, and 10-day-old females for somewhat less than one hour.

"Using virgins, mating was found to be relatively infrequent in 1-day-old females, maximal in females 2 and 3 days old and thereafter decreased as the age of the females increased.

"Females up to 10 days of age were found to be willing to mate on a number of occasions; re-mating was more frequent among the younger flies. The number of older females of *G. palpalis* which are prepared to re-mate is very small.

"Previously mated females of *G. palpalis* were shown to be less willing to mate than virgin females of the same age. It seems that this is due to a decrease in desire for mating by the females rather than a loss of attractiveness to males.

"The implication of these laboratory findings, in relation to fly behaviour in the field, is discussed. It is suggested that a considerable proportion of young females of *G. palpalis* is prepared to re-mate in nature, on a number of occasions, but that the desire for mating is extinguished much sooner in life in mated females than it is in virgin females."

Bursell, E. **The Water Balance of Tsetse Pupae.** *Philosoph. Trans. Roy. Soc. of London.* Ser. B. 1958, Mar. 13, v. 241, No. 680, 179–210, 16 figs. (2 on pl.) [31 refs.]

At 25°C. the duration of pupal development of *Glossina morsitans*, from the time the larval skin darkens to the emergence of the adult fly, is about 30 days. The first part of this paper describes water loss from pupae during this period. From day 0 to day 1, the third instar puparium, water loss is by transpiration through the puparial wall and is directly proportional to the saturation deficiency of the atmosphere around the puparium. From day 2 to day 4, the fourth instar puparium (when the larva is retracted from the hardened third larval skin), water is also lost by excretion *via* the anus. Regulation of water loss is possible at this stage, as excessive loss of water at low humidities by transpiration is compensated by a reduction in the amount excreted. From day 5 to day 30, the pupa and pharate adult, water loss appears to be regulated by spiracular control by the pupa; and the pupal skin, inside the puparium, is relatively impermeable. This spiracular regulation does not appear to be under the control of muscles closing the spiracles [but in this connexion one would like to know exactly when the adult closing mechanism (this *Bulletin*, 1957, v. 54, 1393) begins to operate]. One to two days before the emergence of the adult there is a marked increase in the rate of water loss, and this is attributed to the breaking down of the relatively impermeable pupal skeleton.

The amount of water lost by the pupa is dependent on its water content, and this depends in turn on the humidity to which the earlier stages are subjected. Consequently it is possible, by measuring the rate of water loss from puparia collected in the field, to determine the humidity of the sites from which the puparia were collected, or to use the collected puparia as hygrometers. This is attempted in the second part of the paper.

From the measured water loss of puparia collected in the field over one rainy and two dry seasons, the author concludes that at the end of the dry season in East Africa all the puparial sites have low soil humidities; during the rains all the sites have high humidities; and during the transition period from wet to dry season some sites have low, and some high, humidities. This fluctuation in soil humidity at the puparial sites is opposed to Buxton's conclusion [*ibid.*, 1937, v. 34, 110] that soil spaces in West Africa are very nearly saturated during the dry season.

In the third part of the paper the author goes on to compare the ability of puparia of different species of *Glossina* to resist desiccation. The resistance of the species varies widely. *G. brevipalpis* was not viable after exposure below 60% RH whereas *G. longipennis* was completely viable in dry air. This variation between species was closely related to the waterproofing of the puparium; the order of the species, from most to least susceptible, being *G. brevipalpis*, *G. palpalis*, *G. austeni*, *G. pallidipes*, *G. morsitans* and *G. swynnertoni*. *G. longipennis* was exceptional in possessing a relatively high permeability combined with a great resistance to desiccation. By comparing the water loss from the large puparia of this species with water loss from the equally permeable, but smaller, puparia of *G. austeni*, it is shown that, after 30 days in dry air, the smaller puparia will have lost 42·5% of body weight and the larger only 23·7%. Larger size may therefore result in increased resistance to desiccation. Reduction in size of the permeable polypneustic lobes [*ibid.*, 1956, v. 53, (31)], which are large in *G. palpalis*, and *G. austeni*, and small in *G. swynnertoni*, may also be adaptations to living in low humidities.

The species were found to fall into two groups: those which could tolerate a loss of about 29% of their original weight, or 40% of the initial water content (*G. longipennis*, *G. morsitans*, *G. swynnertoni*), and those which could tolerate a loss of only 24% (*G. brevipalpis*, *G. palpalis*, *G. austeni*, *G. pallidipes*).

The results of these investigations are discussed in detail with reference to the distribution of the species in different habitats; the most primitive of which appears to be tropical rain forest. " . . . invasion of the semi-arid zone has been contingent on the development of more impermeable pupal integuments; while conquest of the xerophytic environment has involved in addition an increase in the quantity of expendable water reserves." *B. R. Laurence*

NIGERIA, NORTHERN. **Ministry of Health. Sleeping Sickness Service Annual Report, 1st January 1957–31st December 1957.** 29 mimeographed pp. 1958: Kaduna.

In 1,688,255 survey examinations during 1957, trypanosomiasis case incidence was 0·15%. This is the same as the previous year's figure, the low level of which had hardly been expected to be maintained. 87·11% of cases found by survey were early (*i.e.*, gland positive) compared with 58·91% of cases in persons reporting voluntarily to hospitals and dispensaries. Provincial distribution of infection remains much the same, except for a relative drop in Plateau Province.

Despite the low overall infection rate, the existence of foci, small and large, of more intense transmission leaves no room for complacency. Left unwatched, trypanosomiasis can get out of control rapidly. Intensive survey and resurvey is the normal way of maintaining control. Mass chemoprophylaxis is being used with good results in three different sets

of circumstances. (1) In heavily infected riverside villages close to a railway station. (2) Protection of mines labour. In southern Plateau mines, at which labourers have received bi-annual pentamidine injections since 1946, only 1 case of suspected sleeping sickness has occurred during the period to date. (3) In one or two areas in which surveys repeatedly show high incidence, and where tsetse control would be unduly expensive. In one such area, Lere district of Zaria Province, a pentamidine campaign reduced the infection rate from 1·47% in 1952 to 0·02% in 1955. A campaign is being conducted at present in the Tiv Division, Benue Province, in the Ndzorov clan in which infection rates have always been high (20·5% in 1939, 5·1% in 1955) and population is falling. One year after the first campaign, case incidence on resurvey has fallen from 1·37% to 0·21%. Melarsen is undoubtedly effective in tryparsamide resistant cases; in Benue Province, where the problem was greatest, the relapse (or tryparsamide resistance) rate has been reduced from 23% to 18% by the more widespread use of Melarsen.

The Tsetse Control Section continued to operate vegetational clearing, and trials of the use of insecticides were carried out on a field scale. A further 221 miles of eradicative clearance in the Kano-Katsina-Zaria scheme brought the total mileage cleared since 1950 to 3,034. *Glossina tachinoides* was found to persist after clearing, in the environs of rocky overhang and permanent pools, or where grasses of the genus *Chloris* provided cover. In Benue Province a full-scale trial of the obstruction method " may be regarded as a qualified success ", though " It is however difficult to say what precise factors were responsible ".

In an insecticide trial in Benue it appeared that a single application of 5% dieldrin emulsion (which has considerable persistence under adverse climatic conditions) might be sufficient where four applications of DDT were needed. In a Katsina trial a single application of DDT (with respraying only of a few thickets) appeared to be very effective. 6 pressure sprayers, dispensing 5% DDT suspension made from 50% wettable powder at an average dose of 35 pounds per square mile, covered 36½ miles of river in 7 days.

After experiment, it is considered that there is no future in the use of arboricides for clearing standing vegetation. 2·4·5-T may be very effective in killing stumps and thus preventing regrowth after mechanical clearing. *B. B. Waddy*

MacLennan, K. J. R. & Kirkby, W. W. **The Eradication of *Glossina morsitans submorsitans* Newst. in Part of a River Flood Plain in Northern Nigeria by Chemical Means.** *Bull. Entom. Res.* 1958, Mar., v. 49, Pt. 1, 123–31, 3 figs.

" The significance of *Glossina morsitans submorsitans* Newst. to the livestock economy of Northern Nigeria is mentioned. Differences in the ecology of the fly have been noted in the Guinea and Sudan savannah

zones, respectively. In the former, its distribution is relatively widespread and diffuse whereas in the latter it is restricted to linear strips associated with river flood plains. The area dealt with in the present work lies in the Sudan zone. The relationship of the fly to its vegetational environment is described, there being a marked concentration of almost the whole tsetse population in evergreen forest islands of relatively limited extent in the second half of the dry season. The source of food is mainly warthog, which were numerous in the area.

" A focus of the fly, covering an area of seven square miles, in which the dry-season concentration sites, mainly forest islands, amounted to approximately 200 acres, was selected for an experiment. It was isolated from the main focus by a natural barrier five miles wide.

" Possible eradication measures in this focus are mentioned and reasons given for adopting the application of a residual insecticide.

" DDT, in the form of a 50 per cent. wettable powder as a 5 per cent. suspension of actual DDT in water, was applied, during the second half of the dry season, at an estimated rate of 20 lb. per acre to the evergreen forest islands, which had previously had paths slashed around and through them. Pneumatic knapsack sprayers were used. A preliminary trial showed that, for up to six weeks after application of the insecticide, examples of *G. morsitans* from unsprayed forest, placed in contact with sprayed leaves and bark, died in three hours, controls remaining alive for 24 hours. It is suggested that this good persistence may be attributable to the fact that the treated surfaces were in the shade, and that the application was made during the rainless season and at a time when the vegetation was dormant. There was a rapid decline in the population of *G. morsitans* after spraying. The flies persisted longest (5 weeks) in a site associated with *Mitragyna inermis*. One application only was given to one part of the focus and in many others one application would probably have sufficed, the second being given in most instances to control *G. tachinoides* Westw., which was also present, and only in two instances for the eradication of *G. morsitans* that persisted after the first application. One of these was the site associated with *Mitragyna inermis*, mentioned above. The last specimen of *G. morsitans* was caught five weeks after the first application, and none has been caught in the sprayed area for up to 18 months after spraying. The cost of the insecticide and labour to apply it amounted to £700 for an area of seven square miles of focus in which the dry-season concentration sites to which insecticide was applied amounted to approximately 200 acres. The final result regarding *G. tachinoides* was indefinite for reasons which are mentioned."

Trinçao, C. & Rui Nogueira, A. Action empêchante de la stylomycine sur l'infection expérimentale de la souris blanche par *Trypanosoma rhodesiense*. [**Suppressive Effect of Stylomycin on** *T. rhodesiense* **Infections in Mice**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 660–63.

Experiments with Stylomycin (puromycin) in which a dose of the antibiotic was given intraperitoneally to mice on the day following inoculation with *Trypanosoma rhodesiense* or on the 2 days preceding inoculation did not suppress infection, although the dosage used was effective therapeutically. Repeated dosage before inoculation with trypanosomes and during the normal incubation period was then tried. For this purpose groups of 16 mice were given 10 and 20 mgm. of the antibiotic per kgm. intraperitoneally for 10 days before and 30 days after inoculation with trypanosomes. With further groups of mice the above treatment was repeated but inoculations with trypanosomes were given 5, 13 and 20 days after the first, and a dosage of 5, 10 or 20 mgm. antibiotic was used. Observation of the blood was continued for 60 to 90 days and the mice were then autopsied. The conclusion reached by the authors is that Stylomycin is on the whole a poor prophylactic against *T. rhodesiense* infections in mice. Untoward effects on the kidneys of these animals were observed at autopsy.

[The antibiotic is a recognized curative agent of infections with *T. rhodesiense* in mice (this *Bulletin*, 1955, v. 52, 134) and immunity from cured infections must have played a considerable part in those cases in which survival did occur.] *J. D. Fulton*

Fernandes, J. F. & Castellani, Olga. **Nucleotide and Polynucleotide Synthesis in *Trypanosoma cruzi*. I. Precursors of Purine Compounds.** *Exper. Parasit.* New York. 1958, Mar., v. 7, No. 2, 224–35. [21 refs.]

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Bell, D. W., Carmichael, J. A. G., Williams, R. S., Holman, R. L. & Stewart, P. D. **Localized Leishmaniasis of Lymph Nodes. Report of Four Cases.** *Brit. Med. J.* 1958, Mar. 29, 740–43. 5 figs. on pl. [13 refs.]

A localized leishmanial infection of lymph nodes, without general visceral dissemination, is exceedingly rare, 1 instance from China [this *Bulletin*, 1943, v. 40, 228] and 2 in U.S. servicemen [*ibid.*, 1945, v. 42, 976] being the only examples which the authors could find in medical literature. They now add 3 further examples of this condition, together with a fourth in which final proof by the demonstration of Leishman-Donovan bodies is lacking. All four were young British soldiers who had been stationed in Malta, where each had been under training for some

2 months when painless enlargement of lymph nodes was first noticed. In 2 patients cervical, axillary and inguinal groups were involved, in one patient the right femoral glands only and in the fourth patient certain cervical glands. Except for slight aching and throbbing in the glands themselves, and local tenderness, the disease was entirely asymptomatic, the patients remaining afebrile and in excellent general health. Examination of the blood showed normal red and white cell counts, normal plasma protein concentration with a normal electrophoretic pattern and negative formol-gel test. The sternal marrow was normal in each case, Wassermann, Paul Bunnell, *Brucella* agglutination reaction, *Toxoplasma* complement-fixation test and dye test were all negative. The Mantoux reaction (1 in 1,000 OT) was positive in 3 patients, negative in the fourth.

The diagnosis was established in the first 3 instances by the identification of scanty leishmaniae in sections of glands removed at biopsy, while in the fourth patient an identical histological picture, and a good response to Pentostam [sodium stibogluconate] therapy justified the diagnosis in the absence of recognizable leishmaniae. Attempts to culture leishmaniae from aspirated gland juice and from the cut surface of the excised glands were unsuccessful in all 3 instances in which fresh material was available, but biological culture in hamsters was not attempted. The histological picture was characterized by massive aggregation of macrophages with the formation of giant cells in varying numbers, while the capsule and periadenoidal tissue were heavily infiltrated with plasma cells and lymphocytes. The characteristic macrophage invasion was most marked at the periphery of the gland. Scanty leishmaniae were found lying within both macrophage and giant cells in the first 3 cases, though none could be identified in the 4th specimen. In 3 patients the surgical incision was slow to heal, and the resulting scar showed marked induration; this subsided on treatment. Sodium stibogluconate was given to each patient by the intramuscular route, a dose of 6 ml. daily for 10 days being employed. In every case this was followed promptly by subsidence of the glandular enlargement and resolution of the periadenitis: all 4 patients have since remained well.

[This valuable paper arouses speculation as to how many examples of the disease may escape recognition among the numbers of patients in tropical practice who present with a comparatively insignificant adenopathy.] *J. H. Walters*

Simitch, T., Pétrovitch, Z., Bordjochki, A. & Pop-Cénitch, S. L'évolution du kala-azar chez les chiens infectés experimentalement par *Leishmania donovani*. [**The Development of Kala Azar in Dogs experimentally infected with** *Leishmania donovani*] *Arch. Inst. Pasteur d'Algérie*. 1957, Dec., v. 35, No. 4, 372–81.

The authors had found 3 out of 137 dogs in southern Serbia in May 1955 infected with *Leishmania donovani*, by inoculating suspensions of

liver and spleen into the ground squirrel. These dogs had shown no evidence of the disease, and in an attempt to explain this phenomenon the authors carried out a series of experimental infections in dogs of various ages, using strains of the parasite isolated locally from dog or man and an Algerian strain (all 4 strains behaved the same), and maintained in *Citellus citellus*. Each dog received an intraperitoneal inoculation of a suspension of infected organ (0·3–2 gm. in normal saline).

Of 8 puppies, 7 died between 24 and 156 days, while one was killed on the 10th day; parasites were found in them all, but only 4 showed clinical signs.

Of 20 adult dogs, 16 showed clinical signs: all lost flesh usually within a month of infection, and became apathetic, though the temperature remained normal; atrophy of the head muscles, desquamation of skin and loss of hair occurred in 14; eye changes were seen in 2 dogs; a bloody diarrhoea occurred in 2 animals. In 13 of the dogs the parasite was found for the first time by sternal puncture; in 2 by blood inoculation into squirrels; and in 1 by spleen smear after death on the 72nd day. Death was delayed in the others up to the 837th day. The formol-gel test showed opalescence and gelification inconstantly, but if it were positive early this suggested a rapid and fatal course of the disease.

4 of the 20 adult dogs were symptomless and detailed observations were carried out on these animals. All showed parasites either directly in the sternum or by subinoculation into *Citellus*; but on sacrifice after a year, 3 at least had proceeded to spontaneous cure and the fourth showed very scanty parasites, while the serological reactions largely became negative in all 4. *P. C. C. Garnham*

Biagi F., F., Marroquín, F. & Gonzalez, A. Distribución geográfica de la leishmaniasis cutánea en México. Hallazgo de una nueva area endémica. [**Geographical Distribution of Cutaneous Leishmaniasis in Mexico. Detection of a New Endemic Focus**] *Medicina*. Mexico. 1957, Sept. 25, v. 37, No. 780, 444–6, 1 map. [21 refs.]

The authors present a map indicating the distribution of cutaneous leishmaniasis in Mexico and refer briefly to the epidemiology of the disease.

They report the discovery in Yaveo, Oaxaca State, of 8 patients with ulcerating subcutaneous nodules on the pinna of the ear. 17 patients with similar lesions were seen in 3 neighbouring districts. 4 of the patients, aged 17 to 55 and born and bred in Yaveo, were studied fully. The lesions had developed in 6 months to 2 years. The Montenegro reaction was positive, leishmaniae were found in histological sections, and the appearance was granulomatous. No mycobacteria or fungi were found.

All the findings suggest that this is a new geographical localization of cutaneous leishmaniasis in Mexico. *H. J. O'D. Burke-Gaffney*

Medina Alonzo, E. Un caso de leishmaniasis tropical y muermo. [**A Case of Tropical Leishmaniasis and Glanders**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1957, Sept.–Dec., v. 14, Nos. 3/4, 63, 1 fig.

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Smith, W. W. **Populations of the Most Abundant Ectoparasites as related to Prevalence of Typhus Antibodies of Farm Rats in an Endemic Murine Typhus Region.** *Amer. J. Trop. Med. & Hyg.* 1957, May, v. 6, No. 3, 581–9, 7 figs. [20 refs.]

"Ectoparasite faunas of 270 *Rattus norvegicus* and 378 *R. rattus* were studied. These rodents were taken alive from untreated rural premises in areas of four southern states where the average noon relative humidity in July is from 50 to 60 per cent. Collections were made during a period when ectoparasites and incidence of typhus were at high levels. The monthly abundance of the Oriental rat flea, *Xenopsylla cheopis*, was found to be associated with the monthly incidences of typhus antibodies in both Norway and roof rats. Populations of the tropical rat mite showed no significant association with the monthly incidences of antibodies in rats. Populations of the spined rat louse were not found to be related significantly to the occurrence of typhus in rats, as indicated by presence of antibodies, and it is considered of no practical importance in natural transmission among the rats considered in this study."

See also p. 951, Studies From Inst. Med. Red. Federation of Malaya No. 28, **Malaysian Parasites XVI–XXXIV.**

Yu, En-Shu, Lin, She-Gin & Ch'en, Chin-Liang. [**Natural Infection of the Domestic Rabbits with** *Rickettsia tsutsugamushi* **in Fukien**] *Acta Microbiol. Sinica.* 1957, v. 5, No. 2, 183–8 [In Chinese.] English summary. [Summary taken from *Rev. Applied Entom.* Ser. B. 1958, Apr., v. 46, Pt. 4, 58.]

The possibility of a connection between the domestic rabbit and tsutsugamushi disease was investigated at Pin-Tan (Fukien) in July and August 1955. It was found that nearly half the farmers reared rabbits, which were fed on grass gathered in the fields and scattered inside the

house. It was thus evident that Trombiculids brought in on the grass might crawl on to people as well as on to the rabbits. *Trombicula deliensis* Walch, *Euschöngastia indica* (Hirst) and *Acomatacarus* sp. were found on the rabbits, the first being much the least common. Of 64 rabbits examined, 16 were found to be infected with *Rickettsia orientalis* (*tsutsugamushi*).

Roger, F. & Roger, Annie. Sur l'hétéro-allergie dans les rickettsioses et, en particulier, sur quelques phénomènes de Sanarelli-Shwartzman survenus spontanément chez des animaux de laboratoire. [**Hetero-Allergy in Rickettsiosis with Particular Study of Sanarelli-Shwartzman Phenomena spontaneously occurring in Laboratory Animals**] *Ann. Inst. Pasteur.* 1958, Apr., v. 94, No. 4, 525–9.

Guineapigs, rabbits, mice and gerbils inoculated intraperitoneally with living rickettsiae (*e.g.*, *Rickettsia orientalis*, *R. burneti*) sometimes develop pneumopathies (oedema, consolidation) which the authors attribute to hetero-allergic reactions set off by the rickettsial antigens in tissues sensitized by antigens of viruses or bacteria. In guineapigs, pneumopathies of this kind are believed to be related to the presence of a latent pulmonary virus (which can be transmitted serially); concomitant intestinal congestion or haemorrhage and adrenal congestion are regarded as manifestations of a generalized hetero-allergic reaction. Rickettsiae were frequently recovered from the lungs of guineapigs with pneumopathy but not when this condition was absent. Pneumopathies occurred in rabbits inoculated intraperitoneally with *R. burneti* when mild pulmonary infection [? of bacterial origin] was present, and in mice or gerbils infected with Herzberg's [pleuro-pneumonia-like] organism [see *Bull. Hyg.*, 1941, v. 16, 476].

From these and other observations it is concluded that localized or generalized allergic reactions, which may be specific or non-specific, are implicated in the pathology of rickettsial infections and may favour proliferation of rickettsiae in abnormal situations. *R. S. F. Hennessey*

Antoine, G. Q Fever à symptomatologie atypique: forme éruptive avec hépatomégalie et ascite transitoire, et diabète. [**Atypical Q Fever. An Eruptive Form with Hepatomegaly. Transient Ascites and Diabetes**] *Algérie Méd.* 1957, Sept., v. 61, No. 9, 991–9.

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Bustamante, M. E. La fiebre amarilla en México y origen en America. Estudio epidemiológico e histórico. [**Epidemiological and Historical Study of Yellow Fever in Mexico and its Origin in America**] *Gac. Méd. de México.* 1957, May, v. 87, No. 5, 357–76, 10 figs. & 1 map. [26 refs.]

de Rodaniche, Enid, Galindo, P. & Johnson, C. M. **Isolation of Yellow Fever Virus from** *Haemagogus lucifer*, *H. equinus*, *H. spegazzinii* **Falco,** *Sabethes chloropterus* **and** *Anopheles neivai* **captured in Panama in the Fall of 1956.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 681–5.

Although no cases of yellow fever in human beings had occurred in Panama after 1949, the infection was thought to be endemic. In the autumn of 1956, mosquito collections were begun and shortly after this a human death from yellow fever was confirmed from the headwaters of the Pacora River. A second catching station was set up in this area. The virus was recovered from each of 3 pools of *Haemogogus lucifer* (107 to 133 specimens per pool), and from a pool of *H. equinus*, a pool of *H. spegazzini falco*, and a pool of *Anopheles neivai* (not more than 49 in a pool), and twice from pools of *Sabathes chloropterus* (51 and 114 specimens). Pools of other species including the abundant *Aëdes leucocelaenus clarki* and *Wyeomyia* spp. were negative.

It is concluded, from a consideration of other published data on yellow fever virus in *H. lucifer* [this *Bulletin*, 1957, v. 54, 674], and its seasonal abundance coincident with jungle yellow fever, that this species is of importance in the transmission of the virus in eastern forested regions near the Canal Zone. The significance of infection in *A. neivai* is uncertain. *D. S. Bertram*

Mattingly, P. F. **Genetical Aspects of the** *Aëdes aegypti* **Problem. II.—Disease Relationships, Genetics and Control.** *Ann. Trop. Med. & Parasit.* 1958, Mar., v. 52, No. 1, 5–17. [Numerous refs.]

Three colour forms of *Aëdes aegypti* were proposed and described earlier by the author [this *Bulletin*, 1958, v. 55, 645] together with an account of their distributions and habits. These were *Aëdes aegypti* ssp. *formosus*, a black form, confined to Africa south of the Sahara and either wild or domestic; *Aëdes aegypti* var. *queenslandensis*, a pale form; and the type form *Aëdes aegypti* of intermediate colour pattern. The type is

the ubiquitous form of world-wide distribution, although in Africa south of the Sahara it is notably coastal; it is largely domestic but may also be semi-wild. Var. *queenslandensis* is more or less sympatric with the type and is seemingly entirely domestic in habit. The present paper discusses some of the ways in which the recognition of these forms qualifies and elaborates the simple principle of transmission of urban yellow fever by *Aëdes aegypti* and the control of the disease by control or eradication of the mosquito.

The type form and var. *queenslandensis* must be the vectors of urban yellow fever outside Africa. In Africa, domesticated strains of ssp. *formosus* are the vectors inland, but all three forms may be concerned in coastal Africa. Implications concerning control appear to be as follows. Eradication of *Aëdes aegypti* of urban and domestic habit has promise of complete success provided the form being controlled is not also able to exist as, or to establish, wild populations from which variants could develop with potentialities for domestication during, or after, the control programme. Such circumstances already exist throughout Africa south of the Sahara, and must be deemed to threaten the attainment of eradication. Thus, the type form is capable of semi-wild habit at least, and ssp. *formosus* may vary from wholly wild to domesticated. Either form challenges success in eradication. The likelihood of wild strains being formed elsewhere in the global distribution of *Aëdes aegypti* hinges, at present, on the capacity of the type to be at least semi-wild. Var. *queenslandensis*, apparently wholly domestic, does not raise the problem. The tendency to form wild strains may depend on, and be directly related to, the lapse of time since the species was first introduced to a territory. If so, control with eradication seems most favourable for areas with comparatively recent introduction. This would seem to apply particularly to Malaya, and, it is possible, even to the Americas with their post Columbian introductions of the species.

For eastern coastal Africa two further issues are raised. All three forms may exist there. But, seemingly as an expression of complex natural balancing factors, yellow fever incidence is low. It is difficult to disregard the possibility that control of *Aëdes aegypti* may be selective against the several forms causing upset of this natural balance, with unpredictable effects on the yellow fever pattern. Secondly, elimination of *Aëdes aegypti* may well be followed by invasion of *A. albopictus* from the East. There is evidence from Malaya that the latter is checked at the aquatic stage when in competition with *Aëdes aegypti*. A further threat to success in control, and eradication, is, of course, acquired resistance to insecticides, which has already made its appearance in *Aëdes aegypti*. Implications of this are considered and the author in this connexion, as well as in regard to normal susceptible strains of the several forms, urges the need for studies on this important mosquito with special reference to the nature and composition of its populations. A better understanding of such matters, in terms of the recognized forms and their

different potentialities for variation in habit and resistance, may be fruitful not only in guiding policy for control and eradication but also in anticipating, on sounder scientific grounds than is possible at present, the problems which may follow control. *D. S. Bertram*

SURTEES, G. **Laboratory Studies on the Survival of the Eggs of *Aedes* (*Stegomyia*) *aegypti* under Adverse Conditions.** *West African Med. J.* 1958, Mar., v. 7 (n.s.), No. 1, 52–3.

At the beginning of the rainy season in Southern Nigeria more larvae of *Aëdes aegypti* are found than would be expected if only a few adults survived the dry season. Eggs laid at the end of the rainy season in October, and during the dry season in November and December, were exposed to field conditions for several weeks. After exposure for 20 weeks more eggs laid at the end of the rainy season hatched (14·8%) than did those laid in the dry season (2% hatch), although some eggs laid in November survived exposure for 24 weeks. Consequently it is concluded that *A. aegypti* can survive the dry season in Southern Nigeria as drought-resistant eggs. *B. R. Laurence*

See also p. 948, BLANTON & PEYTON, **Notes and Distribution of *Aedes* Mosquitoes in Panama based on a Three Year Light Trap Survey.**

MEERS, P. D. **Yellow Fever Vaccination by Scarification.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Mar., v. 52, No. 2, 188.

The correspondent refers to the comment by KERR on his previous observations [this *Bulletin*, 1958, v. 55, 268] and, while agreeing that to raise the 85% immunity rate is most desirable, he points out that the position in West Africa is different from that in South America. In West Africa urban vectors of yellow fever are likely to remain largely uncontrolled for some time. The authorities are therefore at present concerned not only with the unfortunate 15% unprotected persons, but primarily with the prevention of yellow fever epidemics resulting from the introduction of " jungle " virus into communities with low herd immunity. The vaccine in this respect has a double action—it reduces the number of susceptibles at risk, thereby reducing the number of " bridging " (jungle to urban) carriers; and it prevents the initiation of an urban epidemic by an actual carrier because it produces sufficient herd immunity to prevent such an occurrence.

Work at Yaba so far has failed to produce any reduction in the figure of 15% non-immunes, greatly though this is desired; the reason is obscure, and staff considerations have prevented the pursuit of a number of lines

of investigation which suggest themselves. No improvement in the 85% success rate is foreseen at present, short of the use of a more pathogenic antigen (such as the Dakar vaccine strain). *H. J. O'D. Burke-Gaffney*

RABIES

Bartoș, P. Circulația virusului rabic în organismul infectat. [**The Circulation of Rabies Virus in the Infected Animal**] *Studii și Cercetări Inframicrobiol., Microbiol. și Parazitol.* 1957, v. 8, No. 2, 229–38. [26 refs.] French summary.

20 rabbits were inoculated intraperitoneally with street rabies virus, and 30 minutes later the lingual and buccal mucosa was scarified in order to bring blood into direct contact with the nerve endings; 17 developed rabies after 12–64 days, and the remaining 3 died from other causes. In a similar experiment with 20 rabbits part of the ear was cut off and incisions were made into the thigh muscles; 14 rabbits developed rabies after 20–90 days, 5 died from other causes and 1 survived. 4 of 20 animals died of rabies after 23–45 days in a control group in which no incisions were carried out. In further experiments 5 dogs were infected intraperitoneally with rabies virus and the saliva was collected in swabs fixed inside the mouth. By the inoculation of guineapigs with saline extracts of swabs removed at intervals it was possible to demonstrate the presence of rabies virus in the saliva between 2 and 17 hours after infection; the virus was also found in the saliva 2–8 hours after subcutaneous infection. The results show that a viraemia occurs after the inoculation of rabies virus, and that virus is eliminated in the saliva during this phase. *D. J. Bauer*

Veeraraghavan, N., Balasubramanian, A. & Rangaswami, R. **Virus Content of Brains and Submaxillary Glands and Occurrence of Negri Bodies in Animals suspected of having died of Natural Rabies Infection.** *Bull. World Health Organization.* Geneva. 1958, v. 18, No. 3, 469–71.

This paper gives the results of an investigation carried out by the authors to ascertain in an unselected group of dogs suspected to have died of rabies the percentage of animals which showed the virus in the brain, the number which contained the virus in the submaxillary glands, the variations in the virus contents of the brains and the submaxillary glands, the proportion which revealed the presence of Negri bodies in the brain, and the correlation, if any, between the clinical signs and the presence of virus in the salivary glands. In the investigation material for

laboratory examination was obtained from 92 dogs, of which 22 had manifested signs of furious rabies and 21 of dumb rabies, while in 49 the symptomatology had been atypical.

Of the 92 animals studied 61 (66·3%) were found to contain virus in the brain and of that number, thus proved to have been rabid, 36 (59%) showed the presence of virus in the submaxillary glands. Negri bodies were demonstrable in the brains of 54 (58·7% of the total), and among these 31 (57·4%) contained virus in the submaxillary glands. In 5, with virus present in both brain and submaxillary gland, Negri bodies were not found in the brain. The virus titre of the brains varied from less than 10^{-1} to 10^{-5} and that of the submaxillary glands from less than 10^{-1} to $10^{-5\cdot5}$. Of 23 animals, in which the virus titre of both brain and submaxillary glands was available, the titre of the submaxillary glands was greater than that of the brain in 7 (30·4%) and was equal to and less than that of the brain in 1 (4·4%) and in 15 (65·2%), respectively.

As regards the relation of clinical signs to positive findings, it emerged that the laboratory diagnosis was positive in all 43 animals which showed signs of furious or dumb rabies and only in 18 (36·7%) of the 49 which manifested atypical symptoms. The presence of virus in the submaxillary glands was demonstrable in 68·1% (15 out of 22) and 71·4% (15 out of 21), respectively, of cases of furious and dumb rabies. These findings indicate that in nature animals showing either furious or dumb signs of rabies can be equally infective.

[For a preliminary account of this work, see this *Bulletin*, 1955, v. 52, 764.] *G. Stuart*

Starke, G. & Seidl, S. Experimentelle Untersuchungen über die Wirkungen des Ultraschalls auf das Virus-fixe. [**Experimental Investigations on the Effect of Ultrasonic Treatment on Fixed Rabies Virus**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete.* Berlin. 1957, Sept.–Oct., v. 3, No. 5, 333–6.

The Novi Sad strain of fixed rabies virus in the form of a 10% suspension of infected sheep brain was subjected to ultrasonic irradiation with a power of 7 watts per sq. cm. for varying periods up to 60 minutes. Subsequent titration in mice showed that the treatment increased the infectivity titre by 1–2 log units in comparison with untreated control suspensions, presumably on account of liberation of extra virus as a result of the disruption of fragments of tissue. When the experiment was repeated with a 1 in 1000 dilution of the material the ultrasonic treatment produced a fall of titre of 1 log unit. The inactivation was further increased when 0·5% of phenol was added to the virus suspension before ultrasonic treatment. Irradiation of a solution of phenol alone produced a brown discoloration; the virucidal effect was not affected by the treatment, but the toxicity for mice and guineapigs was greatly increased.

D. J. Bauer

Taylor, E. **A Human Case of Rabies with a Short Incubation Period.** *Central African J. of Med.* 1958, Apr., v. 4, No. 4, 170.

"A case of rabies in an African child is described, the point of interest being that the incubation period was probably not more than nine days."

Massonnat, J., Fourrier, A. & Mouchard, G. C. Paralysie ascendante mortelle d'évolution foudroyante, au 10ème jour d'une vaccination antirabique chez un enfant ayant reçu deux ans auparavant un traitement identique. [**Fatal Fulminating Ascending Paralysis on the Tenth Day after Anti-Rabies Vaccination in a Child who had received Identical Treatment Two Years Previously**] *Algérie Méd.* 1957, May, v. 61, No. 5, 571–5. [18 refs.]

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Ajl, S. J., Woebke, J. & Rust, J., Jr. **Inhibition of Keto Acid Oxidation by Plague Toxin.** *J. Bacteriology.* 1958, Apr., v. 75, No. 4, 449–52, 1 fig.

"The mechanism of action of plague toxin at an enzymatic level has been investigated. It has been found that the toxin inhibits the oxidation of several compounds where diphosphopyridine nucleotide (DPN) is an intermediate between substrate and oxygen. The inhibition is relieved on addition of an excess of DPN. A discrepancy exists between the *in vivo* toxicity of the molecule and its action *in vitro*. A plausible explanation for this discrepancy has been offered."

[See this *Bulletin*, 1956, v. 53, 311.]

Berendt, R. F. **Some Physiological and Immunological Properties of *Pasteurella pestis* recovered from Aerosols.** *J. Bacteriology.* 1958. Feb., v. 75, No. 2, 217–23, 6 figs.

[An abstract of this paper appeared in the *Bulletin of Hygiene*, 1958. v. 33, 684.]

Spivack, M. L., Foster, L., Larson, A., Chen, T. H., Baker, E. E. & Meyer, K. F. **The Immune Response of the Guinea Pig to the Antigens of** *Pasteurella pestis*. *J. Immunology*. 1958, Feb., v. 80, No. 2, 132–41. [26 refs.]

"Killed plague vaccines are adequate prophylactics for the guinea pig only when incorporated in adjuvants. Living avirulent plague strains confer solid immunity to the guinea pig although the efficiency of this protection varies with different strains. The antigen in the plague bacillus that confers protection to the guinea pig is the envelope antigen, Fraction I. No evidence of the existence of a qualitatively distinct guinea pig protective antigen could be found. The protein envelope antigen administered to guinea pigs in doses of 1 mg or more in oil adjuvant produces immunoparalysis. The responsible mechanism is under study. The presence of circulating complement fixing, hemagglutinating, agglutinating and mouse-protective antibodies in the serum of immunized guinea pigs is a reliable indication of their immunity to infection. Such antibody is primarily Fraction I antibody. Hyperimmune antiplague serum confers only partial immunity to the guinea pig."

Giannico, L. Rassegna dei mezzi di lotta ratticida alla luce di nuovi ritrovati specifici. [**The Campaign against Rats in the Light of the New Specific Preparations**] *Ann. d. San. Pubblica.* Rome. 1958, Jan.–Feb., v. 19, No. 1, 37–70, 22 figs. & 1 map. [28 refs.]

The English summary appended to the paper is as follows:—

"This paper deals with geographical distribution, anatomico-physiological elements of, and damages caused by, the three species of rodents (*Mus musculus*, *Rattus rattus*, *Rattus norvegicus*) which proved to be the most injurious to man. Afterwards the author reviews the various methods for combating such animals, particularly dwelling on the recent use of anticoagulant preparations containing coumarin derivatives.

"In this respect the author describes the operation of deratization conducted within the harbour of Reggio Calabria by means of the rodenticides we are referring to."

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Chave, S. P. W. **Henry Whitehead and Cholera in Broad Street.** *Med. History*. Farnham. 1958, Apr., v. 2, No. 2, 92–108, 1 fig. on pl. [38 refs.]

Ho, E. A. & T'IEN, S. M. **The Endemicity and Periodicity of Cholera in China.** *Chinese Med. J.* Peking. 1958, Mar., v. 76, No. 3, 266–75. [19 refs.]

The authors, reviewing the numerous statements in text-books and reports to the effect that cholera has long been endemic, or has at least established a periodical endemicity in China, emphatically refute both allegations and bring forward evidence in support of their opinion. Although Chinese historical records make frequent mention of a group of acute gastro-intestinal disorders called *huo luan*, the descriptions given do not indicate a severity compatible with that of cholera. When cholera burst into China in 1820, during the pandemic which spread outwards from India during the years 1817–1823, it was regarded by Chinese physicians as a new disease. Entering at first through the port of Canton by the sea route from Burma and Bangkok, it spread northwards up the coast to Wenchow and Ningpo, and ultimately reached the Yangtze Valley. Its next introduction in 1821 and 1822 to Peking and North China was attributed to the arrival of sepoys of the British Indian army. Thereafter, cholera in China has shown a quite irregular periodicity with intermissions of complete freedom. [Tables illustrate this statement.] During each of the 6 pandemics which swept the world between 1817 and 1923, the first appearance of cholera in China was at the seaports, from which it slowly spread inland along the river and canal systems and over the routes of land travel. On 3 occasions only, in 1890, 1904 and 1933, has the disease appeared in the hinterland while the ports were free from infection, and these outbreaks were of minute proportions

Turning to the allegation that Shanghai has long furnished an endemic focus, the authors have published a table showing the annual and monthly incidence of cholera cases in that city between 1926, soon after compulsory notification had been introduced, and 1948. From this it is evident that the disease was completely absent during 6 separate years, and was not continuously present throughout any infected year, being invariably absent during the cold months of January, February and March. On 2 occasions, in 1930 and 1933, a random survey by stool culture among the Shanghai population failed to reveal a single carrier, while 314 water samples from rivers, creeks and ponds, taken between April 1933 and February 1934, were free from *Vibrio cholerae*. On this evidence the authors affirm that throughout China, and even in Shanghai itself, cholera is an imported disease, every epidemic of which is attributable to a fresh introduction.

The authors next describe the series of epidemics which occurred in Central China between 1938 and 1945 during the period of the Japanese invasion, and which swept over both occupied and unoccupied territories. They state that these outbreaks, which followed a complete intermission between 1933 and 1937, were unique in that the disease was absent in Shanghai and other coastal cities under Japanese control, while the neighbouring countries of Indo-China and Thailand were practically free

from infection. They attribute these epidemics, with their natural spread to adjacent unoccupied territories, to a deliberately conceived campaign of bacterial warfare carried out by the Japanese with the object of exterminating the Chinese civil population. As their authority for this grave indictment they quote a document entitled *Materials in the Trial of Former Men of the Japanese Army Charged with Manufacturing and Employing Bacteriological Weapons*, published in Moscow in 1950. This publication alleges that two of the accused admitted that one production unit, operating in Central China, was capable of a monthly output of "300 kg of plague bacteria, 600 kg of anthrax bacteria, and 1 ton of cholera vibrios".

[This final section of an otherwise admirable and convincing article is unlikely to be accepted without more convincing proof.]

J. H. Walters

Hutchinson, C. A. **The Asiatic Cholera Epidemic of 1833 in Mexico.** *Bull. History of Med.* 1958, Jan.–Feb. & Mar.–Apr., v. 32, Nos. 1 & 2, 1–23; 152–63. [Refs. in footnotes.]

Burrows, W. & Pollitzer, R. **Laboratory Diagnosis of Cholera.** *Bull. World Health Organization.* Geneva. 1958, v. 18. No. 3, 275–90. [Numerous refs.]

This article gives a concise description of minimal procedures for the isolation and identification of *Vibrio cholerae*, with brief discussions of their value in diagnosis. It includes sections on the collection and preservation of specimens, the preparation of culture media, immunizing antigens and agglutinating antisera, and the application of cultural, biochemical and serological methods. The procedures recommended are those used by workers with wide experience in the investigation of cholera.

R. S. F. Hennessey

Guha, D. K., Rudra, B. C. & Mukerjee, S. **Studies on Cholera Infection and Cholera Immunization. Part II. Attempt for Demonstration of Precipitinogen in the Serum of Cholera Patients.** *Ann. Biochem. & Exper. Med.* Calcutta. 1957, v. 17, No. 6, 203–4

"The test for detection of antigen of *V. cholerae* by precipitin test in the blood of cholera cases during the acute stage of the illness gave negative results."

[See this *Bulletin*, 1957, v. 54, 427.]

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Lamy, L. Étude statistique récente sur la fréquence des divers protozoaires parasites intestinaux chez l'homme, à Paris. [**Recent Statistical Study on the Incidence of Intestinal Protozoa in Man in Paris**] *Bull. Soc. Path. Exot.* 1957, Nov.–Dec., v. 50, No. 6, 878–81.

The author presents in tabular form the results of systematic faeces examinations on 1,148 persons in Paris, who have never been out of France or Western Europe.

The statistics have been derived from all sufferers from intestinal diseases, mostly colitis and dysentery, and were supplied by the public hospitals and private practitioners of Paris. They range over the 5 years from 1953 to 1957.

The average percentages were as follows:—*Entamoeba histolytica* 7%; *E. coli* 10%, *Endolimax nana* 3%, *Dientamoeba fragilis* 4%, *Iodamoeba bütschlii* 1·5%, *Giardia intestinalis* 7%, *Chilomastix mesnili* 2%, *Enteromonas hominis* 0·75%, *Trichomonas intestinalis* 0·75%.

It is remarked that these figures approximate closely to those obtained by Chorine and Tanguy in 2,160 subjects who had lived overseas from 1935 to 1943; and other figures recorded from 1926 to 1957 demonstrate the stability of the percentages obtained. The inference is that about 35% of patients with intestinal troubles are parasitized by protozoa.

Philip Manson-Bahr

Bray, R. S. **A Brief Survey of the Intestinal Protozoa of Man, Liberia.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Mar., v. 52, No. 2, 186.

Little attention seems to have been given to the intestinal protozoa of man in West Africa. Results are tabulated of a survey of 100 people in the vicinity of the Liberian Institute of the American Foundation for Tropical Medicine in Harbel, Liberia. Morning stools were examined (a) directly, (b) after zinc sulphate concentration and (c) by stained wet-fixed smears.

There were 92% positive for protozoa and these included *E. histolytica* (52), *Endolimax nana* (35), *Iodamoeba bütschlii* (34), *Dientamoeba fragilis* and *Trichomonas hominis* (18 each), *Chilomastix mesnili* (47), *Giardia* (7), *Enteromonas* (6) and *Embadomonas* (3).

The following helminth ova were also noted: hookworm (94), *Ascaris* (50), *Trichuris* (5), *Enterobius* (1). Strongyloides larvae were seen fairly frequently.

H. J. O'D. Burke-Gaffney

Miller, R. B. **Amebiasis as seen in an Office Practice.** *Amer. J. Med. Sci.* 1958, Mar., v. 235, No. 3, 261–5. [14 refs.]

Earlier fears that the importation into the United States of amoebiasis in troops returning from the tropics would constitute a serious problem in the general population have not been fulfilled. In any event it is now better appreciated that amoebiasis is cosmopolitan in distribution, and not solely tropical. While its more severe manifestations—dysentery and liver abscess—tend to be tropical in distribution the condition nevertheless is always actively or potentially pathological, and commonly it causes a variety of non-specific manifestations of lesser severity. 5 doctors, with the aid of a skilled parasitologist, found 148 (34·7%) of 426 patients to harbour intestinal infections with *Entamoeba histolytica*. Over a period of 16 months prior to July 1957 60 patients (40 women and 20 men) drawn from the upper and middle income groups of Washington were found to harbour the parasite. There was no suggestion of dysentery in 36 of these; 6 had had severe, and the others only very mild or slight dysentery. The family incidence of the infection was notable. Some of the patients had been abroad, others had not. 32 had small cyst-producing races of parasites, 27 large, and 1 both small and large. All but 3 of the patients suffered symptoms they considered to be ascribable to the infection, but objectively the physical findings were non-specific and negligible. Specific amoebicidal treatment appeared to be effective in relieving symptoms, but the follow-up has so far been too short to assess its long-term effect. Associated conditions (which included allergic rhinitis, urticaria, duodenal ulcer, arthralgia and rheumatoid arthritis) were often relieved on treatment of the amoebiasis. *A. R. D. Adams*

Basnuevo, J. G. Indice nacional sobre amibiasis por *Endamoeba histolytica* en Cuba. Reporte preliminar. [**Incidence of Amoebiasis in Cuba**] *Rev. Kuba Med. Trop. y Parasit.* 1957, July–Dec., v. 13, Nos. 7/12, 72–5.

The English summary appended to the paper is as follows:—

"In 120,000 parasitological examinations of the feces, accomplished in the Clinical Laboratory in the Department of Parasitology and Tropical Diseases (Institute of Tropical Medicine) of the University of Havana, during the years 1937–1956, we found 6·5% of positive cases of Endamoeba histolytica.

"The patients who were examined, adults and children, came from all over the country, and were principally workers, farmers, and their families. The higher percentage was found during the year 1949 (9·3%).

"If serial analyses took place, the percentage of amebiasis caused by Endamoeba histolytica would be higher."

Ridley, D. S. & Schofield, F. D. **The Comparative Pathogenicity of Small Race *Entamoeba histolytica* and other Intestinal Parasites.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 514–18.

In order to determine whether the small race of *Entamoeba histolytica* [= *E. hartmanni*] is pathogenic, the authors studied the case notes of patients who had resided in the tropics and attended the Hospital of Tropical Diseases, London, during the previous 2 years. The patients were divided into two groups: (1) 457 with symptoms of diarrhoea, constipation, flatulence and colic or abdominal pain, and (2) 766 who had no intestinal symptoms during the last 2 years. In all these cases records were available of the results of stool examinations for intestinal protozoa. In addition, other parasitic infections in these patients were noted, and the results of the investigation were analysed statistically.

These results are presented in tabular form. The figures shown in the table indicate that the large race of amoebae occurred significantly more frequently in persons with intestinal symptoms, whereas the small race was about equally distributed in both groups, as was also the case in infections with the non-pathogenic amoebae (*E. coli*, *Endolimax*). Moreover, trophozoites of the large race were associated exclusively with the group showing symptoms, whereas those of the small race were encountered only in the symptomless group.

The authors conclude that their "results weigh heavily against any association between the small race of *E. histolytica* and diarrhoea, constipation, flatulence or abdominal pain, within the terms of the trial".

C. A. Hoare

Jarpa, A., Artigas, J., Heymann, Elisabeth & Toledo, L. A., with the technical collaboration of Irma Otto. Rectoscopia y amibiasis intestinal crónica. III.—Estudio parasitario del contenido rectal. [**Chronic Intestinal Amoebiasis and Proctoscopy. III.—Parasitological Study of the Rectum Contents**] *Bol. Chileno de Parasit.* 1958, Jan.–Mar., v. 13, No. 1, 2–7. [62 refs.]

The English summary appended to the paper is as follows:—

"Several techniques for detecting *E. histolytica* in proctoscopic material obtained by various procedures have been studied from a comparative standpoint. Of 254 cases examined, 189 were infected with *E. histolytica*, the diagnosis being confirmed in 88% of the cases by serial stool examinations.

"Trophozoites were investigated by three procedures: observation of wet slides in Foot's chamber; preservation in PVA-fixative; and, cultivation. This last procedure was the most efficient for detecting trophozoites (28%)."

Powell, S. J., Wilmot, A. J. & Elsdon-Dew, R. **A Comparison of Erythromycin, Spiramycin and Novobiocin in the Treatment of Acute Amoebic Dysentery.** *J. Trop. Med. & Hyg.* 1958, Mar., v. 61, No. 3, 67–70. [13 refs.]

70 male African patients in Natal, S. Africa, suffering from acute amoebic dysentery were treated with one or other of these drugs. 21 of them were put on 500 mgm. erythromycin every 6 hours for 10 days; 15 appeared to be cured by the 27th day from the start of treatment, in that in addition to being symptom-free sigmoidoscopically visible lesions had healed and no parasites could then be found. One month later 8 of these 15 were re-examined and 2 had relapsed; 2 months later, of only 4 of these returning for re-examination, another one had relapsed.

30 patients were put on 250 mgm. spiramycin every 6 hours for 10 days; on the 27th day 25 seemingly were cured; a month later 14 of these 25 returned for re-examination and 2 had relapsed; and within the next 2 months 2 others are known to have relapsed.

19 patients were treated with novobiocin in a dosage of either 250 or 500 mgm. every 6 hours for 10 days; of these 6 were apparently cured on the 27th day; a month later 5 of these were re-examined and 1 had relapsed; and within the next 2 months one returning for observation had relapsed.

Although erythromycin and spiramycin temporarily proved very effective in controlling acute amoebic dysentery this was followed by a high parasitic relapse rate. Novobiocin was less effective. None of these 3 antibiotics was as efficient as the tetracycline antibiotics. One patient treated with spiramycin developed an amoebic liver abscess on the 18th day, thus confirming the ineffectiveness of antibiotics in controlling this condition. These findings further emphasize the need for use of amoebicidal drugs with antibiotics for the treatment of acute amoebic dysentery.

A. R. D. Adams

Sankale, M., Rivoalen, A. & Le Viguelloux, J. Le traitement de l'amibiase intestinale et des infections intestinales aiguës ou chroniques par un dérivé de la quinone: le 4–7 phénanthroline–5–6 quinone. (Étude préliminaire à propos de 15 cas.) [**Treatment of Intestinal Amoebiasis and Acute and Chronic Intestinal Infections with a Quinone Derivative, 4–7 Phenanthroline-5-6-quinone**] *Bull. Soc. Path. Exot.* 1957, Nov.–Dec., v. 50, No. 6, 896–901.

This preparation, made by the Ciba laboratories, is an odourless yellow powder and is given in pill form. It is claimed to be amoebicidal *in vitro* and in experimental animals, and also to act on the bacteria found in association with the amoebae. The dose usually given is 4 pills (each of 25 mgm.) in 2 divided doses on the first day; 6 pills in 3 doses on the second; and then 8 pills in 4 doses daily for another 8 days [200 mgm. of the drug daily].

15 patients were given the drug; 7 had intestinal amoebiasis, 3 " meta-

amoebic colitis", and 5 suffered from a non-specific diarrhoea. No side-effects followed; all the patients, it seems, were promptly relieved of their troubles by this drug. *A. R. D. Adams*

Magill, G. B. & Killough, J. H. **Plasma Cholinesterase and other Liver Function Tests in Hepatic Amebiasis.** *J. Lab. & Clin. Med.* 1958, Mar., v. 51, No. 3, 333–44, 2 figs. [28 refs.]

The authors give details of studies carried out in Cairo in 101 Egyptians passing stools containing *Entamoeba histolytica*. The patients were divided into three clinical groups dependent upon the presence or otherwise of evidence of liver involvement (liver tenderness, fever, leucocytosis and demonstrable abscess). Group I consisted of 55 patients with no evidence of hepatic amoebiasis. Group II was composed of 41 patients likely to have hepatic involvement but in whom no evidence of abscess was found. All had two at least of the first three criteria; 15 had all three. Group III consisted of 5 patients with demonstrable abscesses (3 confirmed at autopsy). Controls were apparently healthy Egyptians without *E. histolytica* in the stools.

The following tests were carried out in some or all of these patients: plasma cholinesterase; bromsulphthalein retention; serum bilirubin; cephalin, thymol and zinc turbidities; phenol turbidity (for total lipids).

Abnormally low values for cholinesterase were observed in Groups II and III. The bromsulphthalein clearance was delayed in Group III. Protein turbidities were irregular. Phenol turbidity was low in all patients in Group III.

Analysis of the results showed that the plasma cholinesterase was significantly abnormal in both Groups II (13 out of 21 determinations), and Group III (3 out of 3). Bromsulphthalein retention was increased and phenol turbidity lowered in all cases in Group III.

The authors stress that the changes in cholinesterase were the only significant findings in both Groups II and III. Other parasitic infections, especially schistosomiasis and ankylostomiasis, and factors such as malnutrition and age-groups, all of which were common to the controls, did not appear to disturb the results. They conclude that of the liver function tests studied plasma cholinesterase is the most useful for indicating liver involvement in patients with proved amoebiasis. There was a general correlation between the degree of cholinesterase depression and severity of hepatic involvement but this was of no great prognostic value.

B. G. Maegraith

Wilmot, A. J., Powell, S. J. & Adams, E. B. **The Comparative Value of Emetine and Chloroquine in Amebic Liver Abscess.** *Amer. J. Trop. Med. & Hyg.* 1958, Mar., v. 7, No. 2, 197–8.

The purpose of the present study was to assess the relative efficacy of emetine and chloroquine in the treatment of amoebic abscess of the liver, proved in every case by aspiration.

These two drugs were given to alternate male African patients, suffering from this disease. The finding of any complicating illness excluded that particular patient from the series. Patients were kept under observation in hospital for 30 days and their progress was followed up to 6 months after discharge. Emetine was injected intramuscularly in daily doses of 1 grain each, in 2 courses lasting 10 and 6 days, with an intervening interval of 14 days. In the case of chloroquine (diphosphate) the dose was 4 tablets, each of 250 mgm. [= 150 mgm. base], followed by 2 tablets 6 hours later and then 1 tablet daily for 29 days. In addition, 600 mgm. diiodohydroxyquinoline (Diodoquin) was given thrice daily for 20 days. Tetracycline, 1 gm. daily for 10 days, was added for those with symptoms of amoebic dysentery, in addition to hepatic abscess, as the authors believe that this antibiotic has no action on *E. histolytica* in the liver. The emetine series consisted of 19 patients, of whom 5 had amoebic dysentery; the chloroquine group numbered 16, of whom 3 were likewise affected. 2 of the latter deteriorated, were treated with emetine and recovered.

Taking all in all, there appeared to be no difference in initial response either to emetine or to chloroquine. There could be no doubt, however, that the former was the more effective in producing a permanent cure. For instance, 4 patients in the chloroquine series relapsed within 6 weeks. Pus was obtained by aspiration, but they were subsequently cured by emetine. *Philip Manson-Bahr*

DE CARNERI, I. Metodi usati nella ricerca di chemioterapici antiamebici. [**Methods used in the Study of Anti-Amoebic Drugs**] Reprinted from *Farmaco*. Milan. 1957, Oct., v. 12, No. 10, 449–59. [115 refs.]

The English summary appended to the paper is as follows:—

"The *in vivo* and *in vitro* methods for finding new anti-amebic drugs have been reviewed."

LOGEMANN, W., ALMIRANTE, L. & DE CARNERI, I. Antiprotozoari di sintesi derivati del difeniletere. [**Synthetic Anti-Amoebic Drugs derived from Diphenylether**] Reprinted from *Farmaco*. Milan. 1958, Feb., v. 13, No. 2, 139–51. [22 refs.]

The English summary appended to the paper is as follows:—

"A number of derivatives of diphenylether, with a dichloroacetamide group in the side chain, have been prepared in order to find a compound with improved activity against chronic affections caused by *Entamoeba histolytica*.

"Some of the products described have shown a highly specific and marked activity, *in vitro* and *in vivo* tests.

"Clinical trials, performed with products (II) and (III), have also given very promising results."

Logemann, W., Lauria, F., Tosolini, G. & de Carneri, I. Studio sull'attività microbiologica di alcuni derivati del cloroamfenicolo. [**Microbiological Activity of Certain Chloramphenicol Derivatives**] Reprinted from *Farmaco*. Milan. 1958, Feb., v. 13, No. 2, 129–38. [19 refs.]

The English summary appended to the paper is as follows:—

"The authors have studied a series of propiophenone derivatives as substances with a potential antibacterial, antifungal, antiamoebic and trichomonocidal activity.

"Among the compounds taken into consideration, some of which are already known whilst others have been expressly prepared, the β-chloro-α-dichloroacetamido-propiophenones present marked *in vitro* activity on *Entamoeba histolytica* and *Candida albicans*.

"The synthesis of some new sulfurated propiophenone derivatives has been described."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Walton, G. A. **Studies on *Ornithodorus moubata* Murray (Argasidae) in East Africa. Part I. Observations on Distribution, Food and Climatic Requirements in relation to Relapsing Fever as Evidence of Biological Variation.** *East African Med. J.* 1958, Feb., v. 35, No. 2, 57–84, 1 map. [24 refs.]

In studies extending over nearly 9 years [this *Bulletin*, 1958, v. 55, 510] observations were made on the distribution of *O. moubata* in East Africa with particular reference to the temperature and relative humidity of its microhabitat. In addition data were also collected on the influence of the keeping of fowls in huts on the tick population and on host preference.

The areas studied were the Meru District, the South Nyeri Kikuyu Reserve, the Teita Hills and the Digo District of the Kenya coast. Several representative areas of Tanganyika were also investigated. Altogether 4,638 African huts were examined in the course of this work and observations also made on the effect of the type of bed used by Africans on the degree of tick infestation. From the data accumulated, a hypothesis is presented that four biological variants of *O. moubata* exist. These variants are as follows:—

The "Warthog" form, which occurs in burrows of warthogs and porcupines, often far from human habitation and is widely distributed in East Africa.

The "Man-Eating" form, found in huts in areas with a wet, cool climate. This form prefers to feed on man, and is therefore important in transmission of relapsing fever, but is uninfluenced by the presence of domestic fowls in huts. It appears to be unable to survive in an area where bedsteads are in common use.

The " Chicken-Eating " form, which lives in huts where fowls are also kept and feeds on fowls in preference to man, is probably not important epidemiologically.

The " Mixed-Feeding " form, which feeds on man and fowls and is widespread in the hot, arid areas of central Tanganyika. The use of bedsteads does not seem to prevent this form feeding on man but it is probably not very important epidemiologically. The data are discussed very fully and supported by 10 tables. *E. R. Nye*

Aeschlimann, A. Développement embryonnaire d'*Ornithodorus moubata* (Murray) et transmission transovarienne de *Borrelia duttoni*. [**Embryology of *Ornithodorus moubata* (Murray) and the Trans-ovarial Transmission of *Borrelia duttoni***] *Acta Tropica*. Basle. 1958, v. 15, No. 1, 15–64, 24 figs. [47 refs.]

As a preliminary to the investigations on the transmission and development of *Borrelia* [*Spirochaeta*] *duttoni* in the tick embryo the author describes in detail the embryonic development of *Ornithodorus moubata*. The section on transmission of the spirochaetes establishes that access of the organism to the egg, from the maternal haemolymph of an infected tick, can only occur up to the primary oöcyte stage; after this time the formation of a protective cuticle prevents access of spirochaetes. During embryonic development spirochaetes migrate to the nervous system but do not start multiplying intensively until the first larval instar; subsequently other organs become invaded, including the salivary glands, and the larva becomes infective. No constant correlation was found between the intensity of infection in the mother and that of her progeny, although there was a fair uniformity of infection between the progeny themselves. Thus a female tick carrying a large number of spirochaetes in her brain and ovary was found capable of producing larvae with uniformly small numbers of spirochaetes in their brains, whereas another tick had a comparable spirochaete density in her offspring.

Transmission of spirochaetes to offspring was maintained for 4 generations over a period of 3 years, during which time it was found that the organism lost its virulence to white mice, an observation in line with that of Geigy and Mooser [this *Bulletin*, 1956, v. 53, 196] who noticed loss of virulence of spirochaetes in an African tick population over a 5-year period. *E. R. Nye*

Heisch, R. B., Chamsa, M., Seydian, B. & Harvey, A. E. C. **The Behaviour of Spirochaetes in Lice with special reference to the " Negative Phase ".** *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 735–49.

The authors have studied the behaviour in lice of a number of tick-borne spirochaetes, including strains of *S. duttoni*, *S. microti*, *S. dipodilli*, *S. hispanica*, *S. persica*, *S. harveyi*, *S. latychevi*, *S. turicatae* and *S. parkeri*.

Batches of lice were fed on rats, mice, or newly born rabbits, infected with spirochaetes, and then kept at 28°C. and fed twice daily on human hosts. Several lice were examined daily to see if spirochaetes were present in the haemocoelic fluid, and others were tested for infectivity by inoculating crushed lice into white rats.

The results are given in tabular form and suggest that there are two kinds of development in lice. Some spirochaetes developed readily and after a pseudo-negative phase of a few days, during which the organisms were extremely scanty, they suddenly appeared in very large numbers in the haemocoelic fluid. Occasionally in *S. duttoni* the pseudo-negative phase was masked because the lice had fed on animals too heavily infected. Other spirochaetes were refractory in lice and after persisting in small numbers for a few days disappeared without multiplying.

S. duttoni, *S. microti*, *S. turicatae* and *S. parkeri* developed readily in lice, but generally passed through a pseudo-negative phase when spirochaetes were only demonstrable by the examination of stained haemocoelic fluid and could not be detected in smears of crushed lice. *S. dipodilli* developed erratically and spirochaetes were present in increasing numbers throughout the cycle. *S. hispanica*, *S. persica*, *S. harveyi* and *S. latychevi* were refractory, the spirochaetes persisting for a few days and then tending to disappear. In one experiment, however, *S. hispanica* showed some cyclical development.

S. duttoni, *S. dipodilli* and *S. harveyi* multiplied rapidly when inoculated directly into the haemocoelic cavity; *S. hispanica* only slightly. Lice infected with the first two species were highly infective when inoculated into white rats, but lice containing even very large numbers of *S. harveyi* were almost non-infective. The spirochaetes in lice were shorter than those in blood, but not obviously more slender. Their length ranged from 5·2 to 11·7 μ. It is recommended that in experiments of this type, to reduce cyclical anomalies lice should be fed on animals containing 10–30 spirochaetes per oil immersion field in thick blood smears, and then kept at 28°C.

[This interesting paper supports the view advanced by Heisch (this *Bulletin*, 1956, v. 53, 60) that the apparent absence of spirochaetes during the so-called negative phase in lice may be due to the use of smears of crushed lice which are not so satisfactory as stained drops of haemocoelic fluid for detecting scanty spirochaetes.] *Edward Hindle*

YAWS AND OTHER TREPONEMATOSES

See also p. 834. (i) Chippaux & Anraedt, Le placenta "frais" en chirurgie. [**"Fresh" Placenta in Surgery**] (ii) Guiraud, Thérapie placentaire et affections tropicales. [**Placental Therapy in Tropical Conditions**]

Castellanos, A. & Gonzalez Piñón, L. El Mal del Pinto. [**Pinta**] *Medicina*. Mexico. 1957, Sept. 10, v. 37, No. 779, 401–18, 3 maps.

The authors, from Mexico, discuss the history of pinta, its numerous synonyms, aetiology and methods of diagnosis. The disease is widespread in the tropical countries of America, especially in Mexico and Colombia in each of which some 600,000 persons are said to be affected. In Mexico, the incidence of pinta corresponds with the distribution of the valleys of the great rivers.

The present study is concerned primarily with the state of Oaxaca, where the disease is found in several foci away from lines of communication. Population figures varying from 3,000 to 13,000 are given for 8 districts where pinta is prevalent and reference is made to a few smaller foci. These areas are shown on a map and it is estimated that some 20% of their populations suffer from pinta.

The authors discuss the epidemiology and symptoms of the disease at some length and give figures for the number of persons treated in 39 localities, which varied from 2·6% to 100%. There is an interesting diversion into the political history of the country by way of illustrating the psychological effects of pinta on the unfortunate sufferers and the sense of inferiority which it can cause.

The rest of the paper discusses at length the treatment and control campaigns, with penicillin in the form of PAM, in the State and sets out in great detail the findings for the district of Jamiltepec, where more than 8,000 people were treated of whom about one-third were actually suffering from pinta. The results here and elsewhere are being assessed and the campaign is being followed up towards eradication of pinta from the State. *H. J. O'D. Burke-Gaffney*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Montestruc, E., Berdonneau, R. & Benoist, J. Quelques faits épidémiologiques intéressants concernant la lèpre relevés en 1957 à la Martinique. [**Some Interesting Epidemiological Facts about Leprosy noticed during 1957 in Martinique**] *Rev. Méd. et d'Hyg. d'Outre-Mer*. 1958, May 15, v. 30, No. 268, 70–74.

5 matters of interest are noted. The first is the occurrence of lepra reaction after vaccination against smallpox of 2 patients who had formerly suffered from leprosy, but had apparently recovered under treatment.

In one of these the reaction began on the vaccinated arm and from there spread over the body.

The second record is of a child who suffered from a tuberculoid leprous lesion. The only source of infection traceable was an aunt who had suffered for a long time from the indeterminate form of leprosy and had always been bacteriologically negative. The question is raised as to whether infection can be acquired from one suffering from this form of the disease.

An account is given of a man 72 years of age who was registered as suffering from leprosy in 1957. He had lesions all over his body except on the face. Of his 11 sons, 2 have had leprosy for the last 35 years, but were isolated from the father from the onset of the disease.

During 1957, of 10 leprosy patients enrolled who were aged less than 20, there were 7 of the tuberculoid type. It is agreed that this supports the opinion of other leprologists that there is an increased degree of resistance to leprosy in childhood, but the whole matter requires further investigation.

An account is given of 3 sisters of 12, 17 and 7 years of age, the first having the tuberculoid form and the other two the indeterminate. The lesion appeared in each of these patients on the postero-internal surface of the left elbow. The lesions appeared almost simultaneously about a year ago, from which it would appear that the source of the infection was identical and was outside the family environment. *E. Muir*

See also p. 934, Panse & Gokhale, **Blood Glutathione and its relation with Haemoglobin and Red Blood Cell Count in Tuberculosis, Leprosy and Diabetes. Part II.**

Marneffe, J. Note clinique sur une association rhino-sclérome-lèpre. [**Association of Leprosy with Rhinoscleroma**] *Ann. Soc. Belge de Méd. Trop.* 1957, Dec. 31, v. 37, No. 6, 987–92. [20 refs.]

The English summary appended to the paper is as follows:—

"Clinical description of a case of leprosy associated with rhino-scleroma. The author did not find any reference to an identical case in the consulted literature. As leprosy as well as scleroma are endemic in Ruanda-Urundi, there is not only the problem of differential diagnosis to consider but also the possibility of their association."

Merklen, F. P. & Riou, M. V. Essai de la nivaquine dans le traitement de la lèpre. [**Trial of Nivaquine in the Treatment of Leprosy**] *Bull. Soc. Path. Exot.* 1957, Nov.–Dec., v. 50, No. 6, 888–95.

The author describes the effects of the anti-malaria drug nivaquine in controlling reactions in leprosy which had appeared as the result of

sulphone administration. Cessation of reaction was obtained in the 14 cases in which it was tried, and 9 of which are described in detail. Reactions in nerves are relieved as well as those in skin and mucosa. The effect of nivaquine is not as strong or immediate as that of cortisone, but it is more prolonged. In spite of large dosage (600 mgm. daily, in decreasing dosage) continued over long periods (at least several weeks), there was satisfactory tolerance in all the 14 patients. The only toxic signs were cyanosis, possibly of neuritic origin, in 3 patients and a transitory toxic change in the polymorphs in 1 patient.

It is not necessary to suspend sulphone treatment while nivaquine is being administered. This combination of drugs is also useful in speeding up the recovery of the condition in affected nerves in a way that sulphones alone fail to do. The combination is also of interest as it appears to make it possible to increase the dosage of sulphones at the beginning of treatment with less risk of producing reactions, and the disease clears up more rapidly both in clinical appearances and in bacteriological findings.

Ernest Muir

Hermans, L. De behandeling der lepreuze neuritis en het ulcus perforans in de leprozerij van Tshimuanza. [**Treatment of Leprous Neuritis and Perforating Ulcer in the Leprosy Hospital at Tshimuanza, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1957, Dec. 31, v. 37, No. 6, 861–72. [17 refs.]

The English summary appended to the paper is as follows:—

"The author describes the methods applied in the Leprosy hospital in Tshimuanza (Belgian Congo) in the treatment of leprous neuritis and perforating ulcer. In neuritis the best results were obtained by chlorpromazine. In perforating ulcer sodium dehydrocholate appeared to be the best drug, especially when combined with A.T.S." [a product based on 3% trichloracetic acid and 0·5% salicylic acid].

Lechat, M. & Chardome, J. Evolution radiologique des mutilations chez des lépreux traités par la D.D.S. [**Radiological Evolution of Mutilations in Leprosy Patients under Treatment with DDS**] *Ann. Soc. Belge de Méd. Trop.* 1957, Dec. 31, v. 37, No. 6, 907–18, 14 figs. on 6 pls.

Out of 315 leprosy patients first examined radiologically only 128 were available for a second examination, and all of the latter except 10 showed lesions of the bones of the extremities. All the patients had been on treatment with DDS for 2 to 6 years before the first examination. In 12 cases both hands and feet were examined, in 3 only the hands, and in 113 only the feet. The examinations of each patient were made at

intervals of 17 to 29 months. Of the bone changes in the hands 9 are mentioned. In the feet 16 forms of changes are mentioned including among others: resorption of the distal phalanges, flattening of the joint sockets with subluxation of the first phalanx, concentric atrophy of the phalanx, fracture resulting from atrophy, telescopic shortening at the metatarsophalangeal joint, resorption of the metatarsus. arthrosis, synostosis. Of the 128 patients only 10 showed no lesion of bone at the first examination, and of these (including 9 feet and 8 hands) 1 showed signs of resorption of the second and third phalanges of the foot at the second examination.

It is concluded that though treatment may prevent mutilations where these have not already begun, it does not to the same extent prevent the progress of mutilations which have begun before the initiation of treatment. On this account it is all-important that treatment should be begun early. The article is well illustrated with line drawings and radiographs.

Ernest Muir

Hawking, F. **Growth of Rat Leprosy** *Bacillus* **in Tissue Culture.** *Leprosy Review*. 1958, Apr., v. 29, No. 2, 71–80, 3 figs. on 2 pls. [11 refs.]

In this method of tissue culture a thin layer of fowl plasma was spread over the bottom of a Carrel flask and clotted with embryo extract. Small pieces of leprotic tissue were mounted on top of 1–4 glass slips embedded in the plasma. Growth medium which was then added to the culture consisted of Tyrode's solution plus serum and it was changed 3 times a week. At the selected times a coverslip was removed from the culture, stained and examined for evidence of growth of the *Myco. lepraemurium*. The total number of bacilli in the culture was estimated by the method of Sandford (*Methods in Medical Research*, 1951, v. 4, 219), in which 12 ml. of 1·8% citric acid were added to the flask, shaken at 35°C. for several hours, made slightly alkaline, and 1 ml. of serum added. Samples of 20 cmm. were then spread on slides in a square measuring 2·0 cm. The bacilli lying within 3 strips of 0·1 mm. width were counted and the number of bacilli in the original culture calculated.

The results of some early experiments with small pieces from the edge of lepromata to which were added pieces of normal spleen or liver of young rats showed that it was difficult by this technique to estimate the number of bacilli at the beginning of the experiment in order to compare it with the number present at a later date, and therefore the later experiments were done with macrophages infected *in vivo* with *Myco. lepraemurium*. The macrophages were produced by the intraperitoneal injection of liquid paraffin into rats and a suspension was injected intraperitoneally 3 days before the cells were aspirated. These cells, after about 4–5 weeks' incubation became degenerate, and in some experiments

they were replaced with fresh uninfected cells; in 1 experiment the culture was maintained for 4 months by this method.

Although there was an inevitable loss of bacilli through changing the medium, from the number present at the end of the experiment (52 days), the author judged that the bacilli had doubled their numbers. Bacilli that were present after 42 days were still infective to rats.

The author maintained that these experiments show that this type of culture can be maintained indefinitely and that the bacilli pass readily from one crop of cells to the next in spite of the presence of 40% serum in the medium. Thick fibrin around the cells encourages the growth of the bacilli, and an extract of lepromatous tissue or mycobactin probably promotes multiplication of the bacilli; penicillin 100 units per ml. does not seem to interfere with growth. *S. R. M. Bushby*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*Trematodes *(schistosomes, other flukes);* Cestodes *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* Nematodes *(Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

Dinulescu, G., Stoenescu, D., Ricman, T., Rauchbach, C., Dragoi, I., Sozanschi, M., Negru, D., Donciu, I. & Giuglea, M. Observaţii asupra frecvenţei unor helmintoze la oameni şi interferenţa acestora cu helmintozele cîinilor. [**Observations on the Frequency of Various Helminthiases in Man and their Connexion with Helminthiases in Dogs**] *Studii şi Cercetări Inframicrobiol., Microbiol. şi Parazitol.* 1957, v. 8, No. 2, 297–303. French summary.

The incidence of helminthiasis has been determined in 421 men aged 21–23 years employed in kennels in Bucharest and also in 918 dogs with which they were in contact. The total incidence in the men was 34·94%, the commonest species being *Trichuris trichiura* (23·58%) and *Ascaris lumbricoides* (12·58%), followed by *T. vulpis* (6·10%) and *Enterobius vermicularis* (4·47%); *Ancylostoma* sp., *Capillaria hepatica, Hymenolepis* sp., *Heterodera radicicola, Opisthorchis felineus, Diphyllobothrium latum* and *Dipylidium caninum* were encountered less frequently. The commonest species in the dogs were *A. caninum* (85·51%), *Toxascaris leonina* (48·38%), *T. vulpis* (42·15%) and *Toxocara canis* (14·40%).

D. J. Bauer

COLLINS, C. P. **Incidence of Helminthiasis in H.M. Naval Base, Singapore.** *Med. J. Malaya.* 1957, Dec., v. 12. No. 2, 448–55, 1 graph.

The incidence of intestinal helminths as estimated by direct examination of one faecal smear showed, in 1955, that 35% of the Asian population of the Naval Base at Singapore were infected. In 1956, the age and ethnic group of those admitted as in-patients were noted, and during the year the stools of 1,348 Indians, 371 Chinese, 93 Malays and 176 Europeans were examined.

The results of earlier investigations in Singapore [this *Bulletin*, 1934, v. 31, 765; 1940, v. 37, 237; 1956, v. 53, 1126] are compared, and it is evident that the incidence of all intestinal helminth parasites is falling, and that though the incidence in the Malays has fallen considerably, they still have the highest rate of parasitism. The incidence of hookworm infection is highest in the second and third decades, and in roundworm infection, in early life.

The incidence of hookworm has fallen more than that of infection with *Ascaris* and *Trichuris*. Only *Ascaris* now infects more than 20% of the population of the Naval Base.

Detailed results are shown in 4 tables and a figure.

W. E. Kershaw

GEFTER, V. A., LEVITANSKAYA, P. B. & SHIGINA, E. A. [**A New Method of Investigation with a Vacuum Cleaner of Dust collected on the Household Utensils for Ova of Helminths**] *Med. Parasit. & Parasitic Dis.* Moscow. 1958, v. 27, No. 2, 173–6, 2 figs. [In Russian.]

The English summary appended to the paper is as follows:—

"In order to investigate the dust which was collected from various household utensils for ova of helminths, an electric vacuum cleaner 'Dniepr-1' was used with a special device. Funnel N. 1 with a porous plate was connected by a rubber tube with the common bag of the vacuum cleaner. A membraneous filter was put over the porous plate, which later was recovered from the funnel, and examined microscopically in moist condition. If the dust layer was thick, it was treated as soil. Washings from the sides of the funnel were filtered through Goldman's funnel with a subsequent microscoping of the filter.

"Investigations were carried out in children's institutions. Ova of helminths were revealed about 2½ times more often by the above method in comparison with those found by conventional method of washing by swabs (54% and 21·5% respectively).

"The routes of transmission of helminths within the premises should be studied by the more effective method of examination of household things with the aid of a vacuum cleaner."

Witenberg, G. & Saliternik, Z. **Studies on Vectors of *Schistosoma* in Israel.** *Bull. Res. Counc. of Israel.* 1957, Aug., v. 6B, Nos. 1/2, 107–41, 1 map & 17 figs. on 8 pls. [29 refs.]

"In view of the ubiquity of schistosome vectors and schistosome carriers in Israel, the rarity of new infections is remarkable. This discrepancy is, however, only apparent, as not all the factors in the epidemiological chain occur simultaneously in this country.

"Although Bulinus is found in many foci of Israel, human carriers of *S. haematobium* are rare. They were never numerous and the majority were cured after diagnosis. Furthermore, the local strain of Bulinus is a poor vector of the strain of *S. haematobium* brought by immigrants.

"A similar lack of coincidence of basic epidemiological factors exists in the case of *S. mansoni* infection. Human carriers of this schistosome species are common and dispersed all over the country, but the distribution of its snail-vectors is limited to a restricted part of a single watercourse which is not used for bathing.

"In semi-arid countries, the contact of man with cercariae infested water during artificial irrigation constitutes an important contributing factor in the spread of schistosomiasis. In Israel, this factor is unimportant, because irrigation water is distributed mainly in pipes and very often pumped from deep wells and springs free from snails.

"On the other hand, fish ponds constitute a difficult problem. They are often built on sites of former swamps and in spite of constant clearing work, they cannot always be freed from the obstinate swamp vegetation.

"The present state of the epidemiology of schistosomiasis in Israel must not be regarded as static. Changes in epidemiological factors may occur in the future, and the possibility of spreading infection may increase. Precautionary measures, especially in relation to water utilization and conservation, should therefore be made routine."

Fraga de Azevedo, J., Faro, M. M. da C., de Morais, T. & Dias, J. A. P. de A. As bilharzioses humanas no território de Manica e Sofala e na área da barragem do Limpopo (Moçambique). [**Schistosomiases in Man in the Manica and Sofala Region and in Limpopo Dam Area, Mozambique**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 5–103, 55 figs. (3 on 3 pls.) [15 refs.] English summary.

This survey extends a study made in the south of Mozambique in 1952 [this *Bulletin*, 1954, v. 51, 399; 1955, v. 52, 792]. It covered the Manica and Sofala region and included 18 subdivisions of the districts of Beira and Tete. The survey was made in 1954 and the results are reported in great detail, with maps, diagrams and tables.

The area covered had a population of more than 1 million persons, with an average density of 4·58 inhabitants per square kilometre, most of

them engaged in agriculture. 2,171 persons were examined for the presence of *Schistosoma haematobium* and *S. mansoni*: 89·3% of the subjects were aged 6–15 years.

The topographical and meteorological features are set out in some detail. This is followed by an account of the findings of ova in the urine or stools and the results are shown in terms of age, sex and locality. The infection rate for *S. haematobium* was 64·4% for the whole area surveyed and that of *S. mansoni* was 11·0%. Males had higher (40·2%) rates than females (35·2%). The incidence of schistosomiasis was lower at altitudes above 1,000 metres. Enlarged livers were found in 41·7% of those with *S. mansoni* and 33·5% of those with *S. haematobium*. The corresponding figures for splenomegaly were 46·9% and 32·0%. It was difficult to assess the significance of these findings, since in Africa many causes may contribute to such hypertrophies. Full haematological studies failed to reveal any significant results, other than a marked increase in serum globulin in those infected with *S. mansoni*.

The common molluscs found were *Physopsis* and *Biomphalaria*; about half of the water collections were free from mollusc vectors. Some variation was noted in the chlorides and total hardness of the water in breeding places.

Infection rates of the snails were low: of 154 *Physopsis* examined 0·61% contained cercariae of the human type: the percentage of infected *Biomphalaria* was 0·38% of 513 specimens.

In a small survey in the area of the Limpopo dam (Guija) *S. haematobium* was found in 68 of 100 young people.

The authors compare their findings, in a table, with those of workers in other parts of East and Central Africa. Further research is required and in the meantime all available prophylactic measures should be employed, and these are briefly outlined. *H. J. O'D. Burke-Gaffney*

Hashem, M. **The Present Status of the So-Called "Egyptian Splenomegaly".** *J. Egyptian Med. Ass.* 1957, v. 40, No. 12, 860–69. [22 refs.]

This is defined as a chronic condition characterized clinically by liver and spleen enlargement, and later by hepatic fibrosis, portal hypertension and ascites. Spleen enlargement often is marked and early, hence the name.

The condition is especially common in Lower Egypt where *Schistosoma mansoni* infection is prevalent, but its direct relationship with the latter is still the subject of argument. The author considers in some detail the views of other workers for and against a causal relationship. His own opinion is that there is an early hyperplasia of the splenic reticular tissue in response to toxins originating from the schistosomal infection; this increases and is augmented by infiltrative schistosomal lesions in the liver which cause portal congestion. The hyperplasia of the splenic

reticular tissue in due course results in a diffuse fibrosis with destruction of the musculo-elastic tissue of the splenic trabeculae and capsule; further enlargement of the now inelastic spleen tissue follows steadily increasing portal pressure due to fibrotic infiltration around the hepatic portal radicles caused by schistosomal lesions. *A. R. D. Adams*

Sankale, M., Rivoalen, A., Milhade, J. & Le Viguelloux, J. Considérations à propos d'un nouvel antibilharzien dérivé de la thioxanthone: le chlorhydrate de la 1-β-diéthylamino-éthylamino 4-6-8-triméthyl-5 azathioxanthone. [**Observations on a New Thioxanthone Derivative, 1-β-Diethylamino ethylamino 4-6-8-trimethyl-5 azathioxanthone hydrochloride in the Treatment of Schistosomiasis**] *Bull. Soc. Path. Exot.* 1957, Nov.–Dec., v. 50, No. 6, 917–23.

The xanthone derivatives (Miracil D, Nilodin, Tixantone, Lucanthone) so far used have suffered the defects of their narrow margin of therapeutic safety and of the frequence of the troublesome side-effects attending their use. Their efficacy against *Schistosoma mansoni* infections is poor. This new Ciba preparation is a yellow, odourless but slightly bitter powder; it is given in pills each containing 200 mgm. of the drug. This drug, it is claimed, destroys schistosomes in their various forms both *in vitro* and in experimental animals. The human adult dosage is one pill the first day, 2 the second; and then 3 for 5 days. After a 5-day break 3 pills again are given daily for 5 days.

25 patients (2 of them Europeans) were treated with the drug; in 15 cases *S. haematobium* was the infecting parasite, and in 10 *S. mansoni*. The drug on the whole was well tolerated; but some visual troubles, mild headache, nausea and vomiting, and colic did occur. During treatment the urine turned a yellowish orange colour, but the skin and mucosae were not stained by the drug. Nevertheless, the side-effects due to this drug were slight, and much less than those caused by the earlier xanthone preparations.

In the cases of vesical schistosomiasis the symptoms disappeared, but spleen and liver enlargement present in 2 of these patients persisted. In only a single case, however, did eggs vanish from the urine after the first stage of treatment; and in only 2 cases were they absent after the second. One of these latter patients had a concurrent infection with *S. mansoni*, and eggs of this worm persisted in the stools.

In the intestinal cases also symptoms disappeared and the general condition improved. In 8 of the 10 patients the *S. mansoni* eggs vanished from the stools.

This cure rate is not satisfactory, and the authors suggest that treatment with this drug should be given additionally to, and between, 2 courses of antimony treatment. *A. R. D. Adams*

Chippaux, C. & Cornet, L. La place de la désoxybenzoïne basique dans le traitement de la bilharziose urinaire. [**The Place of Desoxybenzoin in the Treatment of Vesical Schistosomiasis**] *Bull. Soc. Path. Exot.* 1957, Nov.–Dec., v. 50, No. 6, 923–9.

9 African and 2 European patients with *Schistosoma haematobium* urinary schistosomiasis were treated with basic desoxybenzoin given alone. This was used in the form of tablets administered over 2 periods of 8 to 10 days, with an interval of 8 days; the daily dose was 10 to 15 tablets [apparently an average of about 55 mgm./kgm. of body weight] daily. As a rule this treatment should be given between 2 courses of antimony treatment; where symptoms are very severe the antimony treatment may be given concurrently. 9 further patients were given antimony in addition to desoxybenzoin treatment.

Though desoxybenzoin when given alone does not radically affect the adult worms or modify their egg production it lessens the haematuria and other signs of the infection. It causes no side-effects, and it has been shown to exert some antiparasitic action *in vitro* and in experimental animals. Desoxybenzoin therefore can with advantage be given to man during the necessary intermissions between repeated antimony treatments to sustain some form of attack on the parasites. *A. R. D. Adams*

Lagrange, E. Fécondité et régime chez *Planorbis glabratus*. [**Fertility and Diet in** *Australorbis glabratus*] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 804–11.

After observing that specimens of *Australorbis glabratus* fed exclusively on algae for several months failed to lay eggs, the author has carried out a number of experiments to elucidate the relationship between diet and egg-production in these snails. The diets used and the number of egg masses laid are tabulated in the paper. The conclusion is reached that an unknown heat-stable vitamin which withstands cooking at 120°C. is involved. None of the known vitamins appears to be effective in promoting egg-laying in snails. [There seems to be a fundamental misconception in the interpretation of the results. The author observed that completely starved snails and those fed on certain raw plants failed to lay eggs. The same plant foods in a cooked condition proved to be adequate diets and the snails receiving them produced many egg masses. It is known that most planorbid snails are almost unable to eat the tough, living leaves of plants and that their radula mechanism is only capable of tackling soft materials or discrete particles. It is probable, therefore, that those specimens presented with raw *Vallisneria* were unable to eat it in sufficient quantity and were virtually in a starved condition. After cooking, the leaves will have been sufficiently softened and become acceptable to the snails who will eat them and reproduce normally.] *C. A. Wright*

Barbosa, F. S. & Barbosa, I. *Tropicorbis chilensis* **from Santiago, Chile. A Potential Intermediate Host of** *Schistosoma mansoni*. *Bol. Chileno de Parasit.* 1958, Jan.–Mar., v. 13, No. 1, 7–9, 1 fig.

"*Tropicorbis chilensis*, from Santiago, Chile, was proved to be a potential host for a Brazilian strain of *Schistosoma mansoni*. Laboratory infection was obtained in 3 out of 60 exposed snails. The snail was not considered as an efficient host for the trematode."

Díaz-Rivera, R. S.; Ramos-Morales, F.; García-Palmieri, M. R.; González, O.; Marchand, E. J.; Koppisch, E.; Torregrosa, Mercedes V. La esquistosomiasis aguda de Manson. I. El cuadro clinico [Díaz-Rivera, Ramos-Morales, García-Palmieri & González]. *Bol. Asoc. Med. de Puerto Rico*. 1957, May, v. 49, No. 5, 155–73. [13 refs.] II. El tratamiento [Díaz-Rivera, García-Palmieri, Ramos-Morales & Marchand]. *Ibid.*, 174–91. [21 refs.] III. Patogenesis [Díaz-Rivera, Koppisch, Ramos-Morales, García-Palmieri & Torregrosa]. [**Acute** *Schistosoma mansoni* **Schistosomiasis. I. Clinical Features. II. Treatment. III. Pathology**] *Ibid.*, June, No. 6, 201–15. [20 refs.]

These three papers are based on a study of 12 patients in Puerto Rico with acute schistosomiasis due to *S. mansoni* whose exposure had been recent and who mostly had not been exposed before. They were all boys between 8 and 16 years who had been infected in contaminated rivers, during the heat of the day, between spring and autumn.

I. The first paper outlines the clinical features and methods of examination [see also Pons, this *Bulletin*, 1938, v. 35, 597]. These are set out in tables, which include the results of laboratory tests. 3 cases are discussed at length and their findings tabulated.

The condition of acute schistosomiasis consists of a febrile self-limiting phase which occurs in certain cases in those who bathe in grossly infected waters. The clinical picture is variable but the complete picture of mansonian schistosomiasis is most marked in those who had not previously been exposed to cercariae, such as persons visiting in endemic areas, small children and boys deliberately bathing in contaminated water. It is rare in women. In the present cases the incubation period varied from 21 to 42 days (average 28·5). Despite the common opinion to the contrary the immediate and transient skin lesions described were seen in only 4 patients. When the severe symptoms occur they may be difficult to distinguish from many other febrile conditions, especially typhoid fever and other acute intestinal infections. It was found that the presence of ova in the stools was more likely to be found in the early stages of the disease than was a positive rectal biopsy.

II. In this study, the authors treated their 12 patients with various doses of Fuadin [Stibophen] at periods from 44 to 112 days after exposure to infection. They discuss the results at length and relate them to the

clinical and pathological findings. 3 cases are described in full and the general findings are set out in tables.

It would seem that the treatment did not affect the early acute symptoms nor did it prevent the focal lesions in the liver or intestine; nevertheless some patients lost their lassitude and anorexia and put on weight.

Total doses of 40 to 60 cc. of the drug did not destroy the parasite nor did they delay oviposition. Doses between 80 and 100 cc. sometimes suppressed oviposition for 5 to 12 months, but did not destroy the parasite. This temporary paralysis and effect on oviposition seemed to be the principal basis of action of the drug.

III. The authors finally studied the relations between the clinical and pathological features of these 12 cases. Case histories of 3 patients are given in detail and findings are tabulated. The conclusion is reached that a state of hypersensitivity to the worm and its embryos predominates in the acute stage of *S. mansoni* infection. The suddenness of the attack and the duration of the acute phase seem to be related to the degree of hypersensitivity and the severity of the attack to the degree of infection and the general condition of the patient and his immunological response.

The sudden onset, with general rather than local manifestations, resembles that of other severe infections, such as typhoid. The eosinophilia and the gastro-intestinal, hepatic and pulmonary features draw attention to a possible parasitic origin. *H. J. O'D. Burke-Gaffney*

Deschiens, R., Bertrand, D. & Molinari, V. Capacité d'accumulation de certains métaux par les Mollusques de la famille des Planorbidés. [**Uptake of Certain Metals by Planorbids**] *C.R. Soc. Biol.* 1957, v. 151, No. 7, 1356–8.

An interest in the molluscicidal activity of various metals has led the authors of this paper to a study of the uptake of 4 metals by 2 species of planorbid snails (*Australorbis glabratus* and *Bulinus truncatus*).

The metals used were zinc, copper, iron and lead; solutions of them were prepared by placing the pure metals in water for several days, then estimating their concentrations in solution by chemical means before exposing snails in groups of 6 for periods of between 24 and 48 hours. Analysis of the ash of the soft parts of untreated snails showed the normal concentration of these metals in their bodies and this figure is compared with that obtained from snails exposed to the metallic solutions. The results indicate that copper was taken up rapidly and in large quantities, the amount of iron taken up was large but the percentage increase over the normal concentration was much less than that for copper. Zinc, which has a strong molluscicidal effect, was taken up in relatively small amounts, and lead, which is scarcely present in untreated snails, was only slightly absorbed. The authors suggest that the enormous capacity for taking up the toxic copper ions accounts for the molluscicidal efficiency of this metal. *C. A. Wright*

Fraga de Azevedo, J., Carvão Gomes, F. A., Gil, F. M. B., Baptista, A. M. & de Magalhães, E. M. **Application of Radioisotopes to the Study of the Metabolism of Fresh-Water Snails (Gastropoda-Pulmonata).** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 84–9, 7 figs.

"Fresh-water snails (*Helisoma duryi normale*) were placed in solutions containing phosphorus, iodine or copper tagged with the respective isotopes P^{32}, I^{131}, and Cu^{64}. It was shown by means of autoradiographs of the snail tissues that the radioactive compounds were absorbed by the intestinal tract and became diffused through the various organs, with a tendency to concentrate in the hepato-pancreas, especially in the case of phosphorus. The toxic action of copper on the protoplasm was observed, confirming a previous histopathological study. Addition of a phosphate or a sulfate, which are often found in natural habitats of snails, did not interfere with the molluscicidal action of copper sulfate."

Evans, A. S. & Stirewalt, M. A. **Serologic Reactions in *Schistosoma mansoni* Infections. IV. Comparative Ionographic Study of Sera of Hamsters, Mice, and Albino Rats.** *Exper. Parasit.* New York. 1958, Mar., v. 7, No. 2, 165–77, 6 figs.

"Sera of golden hamsters, a highly susceptible host, and of albino rats, a resistant host, with progressive *Schistosoma mansoni* infection were fractionated in a semi-closed, horizontal bridge filter paper electrophoresis system. The results obtained were compared with those from mice, a host capable of maintaining a satisfactory host-parasite equilibrium. Mice and hamsters exhibited similar protein responses, i.e., a marked rise in gamma and beta globulins after patency of the infection, while albino rats showed no protein response to the presence of the worms. The possible significance of this lack of protein response in rats in the light of the previously established serological changes evidenced in this animal in *in vitro* tests is discussed."

[See this *Bulletin*, 1957, v. 54, 839.]

Andrade, Z. A., Branco, M. C., Mello, N., Castro, J. M. & Araújo, M. M. Comportamento das lesões da esquistossomose experimental em ratos tratados pela dl-Etionina. [**Behaviour of Experimental Schistosomiasis Lesions in Rats treated with dl-Ethionine**] *Arquivos Brasileiros Med.* 1957, Mar.–Apr., v. 47, Nos. 3/4, 111–20. 8 figs. [17 refs.]

The English summary appended to the paper is as follows:—

"The dl-Ethionine, a synthetic amino acid, supposed competitive metabolic antagonist and ethylic analogue of methionine, was administered to rats during a period of 28 days and caused degenerative, regenerative

and productive hepatic changes. Disturbances of protein metabolism seem to be the main factor in producing these changes and the histological picture observed could be labeled as early cirrhosis.

"The lesions of active schistosomiasis determined by the presence of the worm's eggs in the liver seem to intensify the changes produced by ethionine.

"These experimental data were discussed from the point of view of their importance in human pathology."

Huygelen, C. Le traitement d'un cas de bilharziose canine à *Schistosoma rodhaini* par un dérivé du thioxanthone. [**Treatment of Schistosomiasis in a Dog due to** *Schistosoma rodhaini*, **with a Thioxanthone Derivative**] *Ann. Soc. Belge de Méd. Trop.* 1957, Dec. 31, v. 37, No. 6, 993–7.

Mao, C. P. **Research on Schistosomiasis japonica in China.** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 58–62, 2 figs.

In 1956, extensive research in schistosomiasis was undertaken in China under the encouragement of the National Research Council on Schistosomiasis. At the Council meeting more than 200 papers were presented and their essentials are as follows.

1956 was the beginning of a 7–12-year period during which the infection was to be liquidated, and in which material, technical and personnel preparations had to be made. "Armed with the general knowledge on schistosomiasis, villagers were able to report the occurrence of the intermediate host, *Oncomelania* snails, and/or the existence of patients with visible symptoms such as ascites. Guided by such information, the staffs of local anti-schistosomiasis stations were able to start a systematic survey on the distribution of *Oncomelania* snails and the incidence among the population. Infection was diagnosed chiefly with the intradermal reaction, seconded, when necessary, by stool examination consisting of both the hatching technique and sedimentation method. Altogether 58,000,000 intradermal tests were undertaken last year. As a result, more accurate data concerning the distribution and the incidence of the disease were gathered: one hundred million people were estimated to be under its constant threat. The endemic area covers eleven provinces and the Municipality of Shanghai. This is an area four times the size of France or nine times that of the United Kingdom." Reservoir hosts included domestic and wild animals; 91% of cattle were infected in some areas.

Oncomelania snails breed in highly saline or alkaline waters in addition to fresh waters, and breeding is cyclic. The belief that snails live in water during the summer and out of water during the winter should be revised.

Infected irrigation canals were treated by digging by farmers under the supervision of the staff of schistosomiasis stations, in such a manner that

the snails were buried 10 cm. or more, after which the snails die in 3–6 months. In vast swamps, extermination is possible after draining and deep ploughing. Calcium arsenite has been found to be effective as a molluscicide. Gas torches, with a flame half a metre long, kill 90% of the snails. For faecal control, calcium cyanamide used in the fertilizing concentration of 0·3% kills schistosome and hookworm eggs, and, if the night soil is composted, the heat generated also kills fluke eggs. Cercariae are killed by Halozene disinfection of water, or by high-test calcium hypochlorite or by iodine. Fine cloth impregnated with benzyl benzoate protects against penetration. Cercariae do not occur in deep water, and the deep water from an infected canal can be used to fill a portion of the canal which has been cleared of snails after draining, drying out, and clearing.

The efficacy and side effects of 3- and 7-day courses of tartar emetic were compared. The relapse rate in each was between 20–30%. The effects of glucose and procaine to alleviate toxic effects were equivocal. Atropine is suggested to prevent the vagal overaction from the changes induced by arsenic in the central nervous system which is possibly responsible for cardiac ventricular fibrillation.

4% of the patients in Shanghai had nervous symptoms; no adult worms were found in the central nervous system; thickening of the meninges, adhesions, exudations, small tubercles, granulomata containing schistosome eggs and cerebral oedema were the usual lesions.

Diagnosis by serological methods was done by intradermal testing with antigen made from adult worms and from eggs or miracidia. The precipitin test and the cercarial-serological test have been found useful in early cases.

Of more than 100 new compounds tried, two new antimonials, Sb-5, and Sb-11, and ammonium antimony gluconate had a stronger schistosomicidal effect than tartar emetic. The efficacy of antimony compounds is not necessarily related to their antimony content.

Experimental studies show that antimony can inhibit the central nervous system, and produces changes in the glycogen metabolism of the liver. Enzymes containing the active SH group are involved in glucose metabolism, and since they can be inhibited by antimony, compounds containing this group were tried for detoxicating action. Mice thus treated could tolerate much larger doses of tartar emetic, but the drug was rendered therapeutically ineffectual. Chloral hydrate reduced the toxicity without affecting the efficacy, but bromides and barbiturates increased the toxicity.

Screening of drugs was done by observing the movement of the adult worm to the liver 2 hours after treatment.

In vitro cultivation of the schistosomes has been facilitated by improvements in the culture flasks and in the media (the addition of amino-acids, particularly the prolines) which have led to more prolonged survival and to slight development.

" . . . General planning under a unified leadership and the full cooperation of the Ministry of Agriculture, Ministry of Health and Ministry of Water Conservancy in the anti-schistosomiasis campaign provided a strong guarantee of the success of research work in the prevention and treatment of the disease. The aim of scientific research is to serve the anti-schistosomiasis campaign and all the useful results obtained such as the use of intradermal reaction in the epidemiological survey, the deep-burying of the snail host and the extensive trial of the 3-day treatment were immediately endorsed by the administrative authorities and executed in all the endemic areas. The intimate correlation between mass campaigns and technical application is a very outstanding feature in scientific work in China today."

[This article is an account of a most important venture.]

[See also this *Bulletin*, 1958, v. 55, 549.] *W. E. Kershaw*

Liu, J., Cheng, Wei-Ju, Huang, Ming-Hsin, P'An, Ju-Sun, Chiang, Shao-Chi, Hsü, Chao-Yüeh, Hsü, Pao-Yuan & T'Ang, Ching-Yi. **Acute Schistosomiasis japonica.** *Chinese Med. J.* Peking. 1958, Mar., v. 76, No. 3, 229–42, 1 fig. [10 refs.]

Floods in Kiangsu province, China, in 1954 were followed by a sharp increase in incidence of schistosomiasis. This is an account of 200 acute cases of the disease seen in 1955, all with presumptive primary infections; all but 4 of the patients were males; their ages ranged from 7 to 60 years, most being between 11 and 30 years. None of the patients were peasants, and chronic cases with recent re-infections have been excluded in this series.

23 patients gave a history of a single exposure to infection; 88 patients recalled a cercarial dermatitis. The onset of the disease usually was about 34 days after exposure to infection; it was acute in 144 and insidious in 56 patients. Fever was the constant and outstanding clinical feature, and respiratory symptoms occurred in 126 cases. Abdominal symptoms were much less frequent than was anticipated—41%, 51% and 10% of the patients complained of colic, diarrhoea or dysentery respectively. Tender enlargement of the liver was noted in 193 cases, and spleen enlargement in 130; in 3 cases the liver involvement was wrongly attributed to an amoebic liver abscess. Leucocytosis (10,000 to 30,000 per cmm.) with marked eosinophilia (a mean of 39·6%) was constant; the eosinophilia did not parallel the intensity of the parasitic infection. In some extremely heavy cases of infection eosinophilia was slight or absent. Only 1 patient had patent jaundice, 4 others had latent jaundice (bilirubin 1 to 2 mgm.%); the plasma globulin, but not albumin, was raised and this accounted for a high plasma protein level with positive serum flocculation reactions. Electrocardiographic irregularities were found in 19 of 39 patients thus examined; these presumably were due to the toxic effect of the parasite and rendered the patients the more

susceptible to the toxic action of antimony subsequently used in treatment. *Schistosoma* ova were readily recovered from stools of 112 patients, and hatching tests were positive with 98% of stools from 193. Rectal biopsies done on 35 cases yielded numerous ova in 19; on sigmoidoscopy of 85 patients significant mucosal changes were seen in 63. 2 patients had cerebral symptoms, one of them taking the form of status epilepticus during high fever, and the other a hemiplegia.

Ectopic lesions, particularly in the lungs, evidently are not uncommon in acute *Schistosoma japonicum* infection. The clinical picture is therefore protean in type and the diagnosis may readily be confused with that of malaria, septicaemia, typhoid, tuberculosis, dysentery or gastroenteritis, or hepatic amoebiasis. A history of exposure to possible infection, and the development of fever with eosinophilia and liver enlargement is suggestive of the correct diagnosis. Overwhelming infections are commonly fatal, and 8 of the patients here under review died before or during specific treatment. The relapse rate after treatment is high.

A. R. D. Adams

STAUBER, L. A. **Swimmer's Itch in New Jersey.** [Research Notes.] *J. Parasitology.* 1958, Feb., v. 44, No. 1, 108.

Although cercarial dermatitis has been suspected in New Jersey for years, no report of it from that State appears to have been recorded in the literature.

The author now records cases which appeared there in the summer of 1957 and which were associated with both fresh and sea water.

Bathers in a swimming pool, a dammed part of a brook, in Summit, N.J., suffered from skin eruptions associated with entry into the water, more frequently on sunny than on cloudy days. Wild and domestic ducks had been on the pool. From snails obtained in the pool cercariae were identified in one specimen of *Physa heterostropha*. The cercariae closely resembled those of *Cercaria physellae*. Both species are identical with those reported in an outbreak in New York in 1947.

The author and his children were digging clams on the tidal flats of the Bay Shore of Cape May when the water was a few inches deep. Skin lesions occurred in all, but those in the children were delayed, itched less and faded sooner than those in the author whose feet were covered with lesions. Although he had swum hundreds of times since his own childhood in New Jersey waters where infected snails were found this was the author's first known instance of infection. His immediate response on the present occasion suggested previous but unknown sensitization by cercariae. Specimens of the suspected snail, *Nassarius obsoletus*, showed infection with *Microbilharzia variglandis* which is known to produce dermatitis [this *Bulletin*, 1953, v. 50, 42, 1062].

The author suggests that while unusual circumstances may be necessary for infection to take place in tidal waters, further outbreaks of swimmer's

itch may be noticed with the increase in the number of artificial ponds constructed for the purposes of swimming and irrigation.

H. J. O'D. Burke-Gaffney

Kuwamura, T. [**Study on Experimental Clonorchiasis especially on the Histochemical Change in the Liver**] *Shikoku Acta Med.* 1958, Jan., v. 12, No. 1, 28–57, 24 figs. on 4 pls. & 6 charts. [36 refs.] [In Japanese.] English summary.

The response of rabbits to infection with *Clonorchis sinensis* was followed for 8 months by histological, histochemical and biochemical methods.

The worms lie in the bile ducts, mostly in the right lobe, less frequently in the left, in the bile ducts outside the liver, the quadrate lobe and fewest in the caudate lobe.

Localized necrosis and fibrosis occur with thickening of the bile duct, most marked at the surface of the liver during the early stages, but later these changes become more general.

In the early stages (10–50 days), the function of the liver cell is depressed, the nucleic acid, protein and polysaccharide contents fall; alkaline phosphatase is raised, and acid phosphates transiently increased, to fall by the 60th day. From the 60th to the 90th day, normal conditions persist, but after 100 days cirrhosis occurs, when all fall remarkably.

The plasma albumin falls, and the alpha and beta globulins rise. The gamma globulin rises in those cases with marked plasma cell infiltration and in those in which course of infection is long. *W. E. Kershaw*

Orduña Prieto, C. Frecuencia de las helmintiasis en la región berciana. Estudio especial de un caso de parasitismo por fasciola hepática. [**Incidence of Helminthiasis in the Bierzo Region, Spain, with special reference to a Case of *Fasciola hepatica* Infection**] *Rev. Sanidad e Hig. Pública.* Madrid. 1957, Sept.–Oct., v. 31, Nos. 9/10, 493–515, 16 figs. on 4 pls.

The material studied by the author was obtained during the course of examinations by the sickness insurance organization at Ponferrada, Léon Province, Spain and relates to persons from the Bierzo region and neighbouring districts which includes a number of mining valleys. Faeces and the products of duodenal intubation were examined in the case of 200 patients, whose case histories are given. The results are set out in tables and discussed and illustrated by 16 photomicrographs of helminth eggs. All the patients were older than 10 years. Helminths were found in 112 cases (56%). *Enterobius*, *Ascaris* and *Trichuris* each accounted for about 21% of the findings, *Taenia* was 1·5% and hookworms and *Hymenolepis* were found once each. In some 60% of cases, the patients showed no symptoms. Of the various forms of treatment tried, piperazine

adipate was most effective for *Ascaris* and *Enterobius* infections, in which the cure rate was between 92% and 97%.

A full account is given of a case of *Fasciola hepatica* infection in a man of 21, which was diagnosed by duodenal intubation, and which is regarded as a comparatively rare finding, by such a method, in Spain.

H. J. O'D. Burke-Gaffney

Westermeyer, J., Faiguenbaum, J. & Romero, Gloria. Un caso de distomatosis hepática complicado con empiema vesicular. [**Gall-Bladder Empyema as a Complication of Distomiasis**] *Bol. Chileno de Parasit.* 1958, Jan.–Mar., v. 13, No. 1, 11–13.

The English summary appended to the paper is as follows:—

"A human case of gall-bladder empyema produced by *Fasciola hepatica* where the usual concomitant lithiasis was not observed is reported."

Saínz, P. A. Sobre tres casos humanos de Fascioliasis hepática con sintomatología infrecuente. [**Three Cases of** *Fasciola hepatica* **Infection with Unusual Symptoms**] *Rev. Kuba Med. Trop. y Parasit.* 1957, July–Dec., v. 13, Nos. 7/12, 67–70.

Sarajas, H. S. S. & Pätiälä, R. Köldverkan på utvecklingskapaciteten hos binnikemaskens (*Diphyllobothrium latum*) ova. [**The Effect of Cold on the Developmental Capacity of the Fish Tapeworm** (*Diphyllobothrium latum*) **Ova**] *Nordisk Hyg. Tidskr.* 1958, v. 39, Nos. 3/4, 49–52.

The English summary appended to the paper is as follows:—

"Human fecal specimens containing fish tapeworm ova were subjected to low environmental temperatures for varying periods. The developmental capacity of the ova was then followed in an aqueous cultivation medium. It was found that the fish tapeworm ova lose their developmental capacity after being exposed to environmental temperatures below zero. This suggests that the feces from individuals parasitized by the fish tapeworm does not infect water-courses during the cold season, provided the fecal mass has been lying exposed to environmental temperatures below zero."

Nyberg, W. **The Uptake and Distribution of Co^{60}-Labeled Vitamin B_{12} by the Fish Tapeworm,** *Diphyllobothrium latum*. *Exper. Parasit.* New York. 1958, Mar., v. 7, No. 2, 178–90, 4 figs.

Diphyllobothrium latum contains large amounts of vitamin B12 [see this *Bulletin*, 1953, v. 50, 553] absorbed probably from the gut contents rather than from the mucosa. The uptake of the vitamin has been

studied by giving vitamin B12 labelled with ^{60}Co to 118 subjects infected with *D. latum*, and 15 infected with *T. saginata*. Cobalt chloride labelled with ^{60}Co was given to 8 controls infected with *D. latum*, and to 6 with *T. saginata*. [The details of the experiments are given in full.]

D. latum absorbs, on the average, a little less than half of a single oral dose of radio-active vitamin B12 given to the host. Considerable individual variations may be due to the site of the worm in the gut, since the vitamin is absorbed in the duodenum and proximal part of the jejunum, to the sexual maturity of the worm, for the absorption is greatest in the zone of growth, and to variations in the bacterial flora. *W. E. Kershaw*

Biagi F., F. & Tay, J. **A Precipitation Reaction for the Diagnosis of Cysticercosis.** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 63–5.

Pork infected with *Cysticercus cellulosae* is frequently found in slaughterhouses in Mexico [see this *Bulletin*, 1955, v. 52, 280]. Human cysticercosis is second to amoebiasis as a parasitic cause of death in Mexico City, and during the last 4 years at the Pathology Unit of the National School of Medicine, 39 cases of cysticercosis were found in 1,339 autopsies.

The only serological aids to diagnosis at present are the complement-fixation reaction and the precipitin reaction. The complement-fixation reaction on the spinal fluid is sensitive, but gives false positive results in cases of neurosyphilis, and a reaction with serum gives many false positives. The precipitin reaction has not hitherto been adequately assessed.

Antigen was made by different methods and from different parts of the cysticercus from pigs [the practical details should be consulted in the original], and after preliminary screening, 1 of the 22 antigens made was tested with the sera of 39 pigs with cysticercosis, 50 normal pigs, 1,108 unselected human sera, 1,043 insulated spinal fluids and 9 spinal fluids from human cases of cysticercosis.

The reaction was sensitive; it did not give cross reactions with other parasites including taeniae, or in neurosyphilis. The precipitin reaction gives great promise in the diagnosis of cysticercosis, and it is hoped to assess its value further in proven human cases. *W. E. Kershaw*

Read, C. P.; Schiller, E. L.; Phifer, K.; Rothman, A. H. **The Role of Carbohydrates in the Biology of Cestodes. V. Comparative Studies on the Effects of Host Dietary Carbohydrate on *Hymenolepis* spp.** [Read, Schiller & Phifer]. *Exper. Parasit.* New York. 1958, Mar., v. 7, No. 2, 198–216, 2 figs. [10 refs.] **VI. The Carbohydrates Metabolized *in vitro* by some Cyclophyllidean Species** [Read & Rothman]. *Ibid.*, 217–23.

Bulgakov, V. I. [**On the Diagnostic Value of Certain Reactions in Echinococcosis and their Technique**] *Med. Parasit. & Parasitic. Dis.* Moscow. 1958, v. 27, No. 2, 152–7, 2 figs. [Numerous refs.] [In Russian.]

The English summary appended to the paper is as follows:—

"Casoni's reaction was carried out in 200 patients with echinococcosis which were subjected to surgical treatment. As control this reaction was also performed in 388 patients with other diseases and in 180 healthy persons.

"The following conclusions were drawn:

"Casoni's reaction is specific for echinococcosis. However, if negative, it is not an absolute proof of the absence of echinococcosis.

"Prolonged boiling of echinococcal fluid has no effect on its antigenic properties.

"Extract of boiled membrane of the hydatid cyst is also a carrier of antigenic properties which is not less than that found in echinococcal fluid.

"Eosinophilia is frequent in echinococcosis, but it is not a very valuable symptom in diagnosis. Palpation of the organ containing the hydatid cyst to provoke eosinophilia is dangerous since it may bring about complications."

Hsü, Mei-Chuan, Huang, Cheng-Chi, Peng, Huan-Chang, Su, Hung-Lin, Chang, Chin-Chao, Yu, Tien-Lu, Wu, Chun-Chung & Huang, Wen-Hsien. **Observations on Hookworm Disease among Coal Miners in Taiwan. I. A Survey on the Incidence of Hookworm Infection in the Workers of Coal Mines.** *J. Formosan Med. Ass.* 1958, Jan., v. 57, No. 1, 22–3.

Between March and October 1954, the authors, in Taiwan (Formosa), made a survey of the incidence of hookworm infection among 3,630 coal-miners, 115 members of miners' families, 305 office workers and 134 of their families. A single faecal smear was examined in each case by direct and concentration methods. The positive findings were respectively 85%, 57%, 51% and 33%. In the various mines, 21 of which were chosen at random from the 256 coal mines on the island, the infection rate varied from 65% to 98%. The incidence in underground workers was 87% and in surface workers 77%. The only significant differences according to the type of work were among mechanics underground, who had a lower infection rate (78·5%) than other underground workers and among technical surface workers, who had a lower rate (58%) than other surface workers.

Period of service was not significant except in the case of those underground workers with 1 to 5 years service, in whom it was higher (89%) than in any other.

Infective hookworm larvae were isolated from soil in the pits and in the vegetable gardens of the miners' houses. *H. J. O'D. Burke-Gaffney*

Dissanaike, G. A., Jeffery, G. M. & Barton, B. P. **Radioactive Tagging of Hookworm Larvae** (*Necator americanus*) **with P^{32}.** *Exper. Parasit.* New York. 1958, Mar., v. 7, No. 2, 249–53.

Larvae of *Necator americanus* were successfully labelled by cultivating in an isotonic saline and charcoal culture, in the presence of added bacteria which had been previously immersed in isotonic saline containing ^{32}P.

W. E. Kershaw

Carneiro, J. F. Doença de Löffler recidivante e aneosinofílica em paciente com estrongiloidose e aplasia do setor eosinofílico. [**Recurring Loeffler's Disease without Eosinophilia in a Patient with Strongyloidiasis and Eosinophilic Aplasia**] *Arquivos Brasileiros Med.* 1957, Jan.–Feb., v. 47, Nos. 1/2, 1–6, 5 figs. English summary (9 lines).

Swartzwelder, J. C., Muhleisen, J. P., Abadie, S. H., Frye, W. W., Jones, C. A., Robertson, P. E. & Hebert, J. F. **Therapy of Strongyloidiasis with Dithiazanine.** *Arch. Intern. Med.* 1958, Mar., v. 101, No. 3, 658–61.

Dithiazanine is 3,3′-diethylthiadicarbocyanine iodide. 17 rats, 200–250 gm., which had been infected with *Strongyloides ratti*, were given 10 mgm. by stomach tube twice daily for 7 days. They were killed on the day after treatment. No adult worms, larvae or eggs could be found in the alimentary canal. The drug acts on the adult worms and not on the eggs or rhabditiform larvae. The mucosa of the small and large intestine was stained light green or blue. Apparently the drug also removes *Hymenolepis nana* and *Syphacia obvelata*.

18 male patients infected with *S. stercoralis* (many without symptoms) were given 200 mgm. by mouth 3 times daily two hours after meals for 21 days. (A period of 5 days was tried, but was inadequate in some patients.) The drug was mostly given as 100 mgm. enteric coated tablets designed to release the drug after passage through the stomach. In 16 of these patients the worms could not be demonstrated in the alimentary canal after treatment, in spite of intensive investigation including duodenal intubation. One of the patients, in whom infection persisted, had been treated for only 6 days, after which treatment was stopped for reasons unrelated to therapy. As regards toxic effects, 2 patients had mild evanescent diarrhoea, and 1 patient vomited twice. The stools became deep blue. Investigations on the liver and kidneys revealed no toxic effects. It is concluded that dithiazanine is an effective drug for the treatment of strongyloidiasis.

F. Hawking

Nagaty, H. F. & Rifaat, M. A. **Treatment of Roundworm (*Ascaris*, *Ancylostoma* and *Trichostrongylus*) Infections with Piperazine Adipate.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 1, 73–5.

The authors, from Cairo, refer to some of the studies carried out on the use of piperazine salts in the treatment of intestinal helminthic infections by other authors and by themselves [this *Bulletin*, 1957, v. 54, 725]. They now present the results of trials of the adipate against *Ancylostoma*, *Ascaris* and *Trichostrongylus* infections in a village of Giza Province, Egypt, where some 80% of the population are infected with *Ancylostoma*. The patients were all more than 15 years old. Stools were examined by saline flotation and follow-up was continued daily for 2 weeks: cure was accepted when the last 10 consecutive stool examinations were negative. The patients were not prepared in any way and no purgatives were given. No toxic effects were noted. The results are tabulated. The dose of piperazine adipate used for *Ascaris* infection was 35 to 67 mgm./kgm. daily. 45 patients received 2·7 gm. daily for 3 days and 39 were free of ova in 2 weeks. 27 patients with *Trichostrongylus* received a single dose of 4·5 gm. and 20 were cured. In the case of 98 patients with *Ancylostoma* the initial dose was 4·5 gm. repeated 3 days later and again 2 days later. No effect of the drug on the infection was noted.

Further trials are being made with the aim of finding a single dose of the drug which will cure *Ascaris* infection.

[See also *ibid.*, 1958, v. 55, 793.] *H. J. O'D. Burke-Gaffney*

Danaraj, T. J. **The Treatment of Eosinophilic Lung (Tropical Eosinophilia) with Diethylcarbamazine.** *Quart. J. Med* (n.s.) 1958, Apr., v. 27, No. 106, 243–63, 7 figs. [51 refs.]

This paper crystallizes in some detail the author's further experience in the treatment of the eosinophilic lung in Singapore with diethylcarbamazine [this *Bulletin*, 1957, v. 54, 490, 1341]. The study comprises the records of 110 patients so treated, but no significant difference in respect to race, age, sex or occupation was apparent between the present series and that of 150 cases reported in 1951 [*ibid.*, 1952, v. 49, 316].

In nearly all patients, radiological examination of the chest revealed increased striation with varying degrees of mottling.

The dosage of diethylcarbamazine given initially to 46 patients was that usually recommended for ascariasis: 4 mgm. per kgm. body weight 3 times daily for 4 days. Later, larger doses were tried. The average total for three dosage schedules was 3,200 mgm., 6,000 mgm. and 10,000 mgm.: the drug was given in 50 mgm. tablets, dissolved in syrup for children.

Improvement in symptoms was noted in 107 on the second to fourth day of treatment. There was complete relief in 59 in the first week. The remainder also progressed during the second to the fourth week, with

decrease of the paroxysms of cough; the nights became restful and sleep undisturbed. Coincident with symptomatic improvement a general clearing of abnormal lung signs took place. When the leucocyte count was done on the third day of the course a marked decrease in the eosinophils was found in 98 patients; in the remaining 12 an increase was recorded on the third day, followed by a decrease on the fifth. In some cases the fall was very gradual and in 2 patients counts of 4,550 and 3,922 cells per cmm. persisted in spite of the complete relief of symptoms. The blood sedimentation rate was also significant. Abnormal readings before treatment were obtained in 99, but the rate had reverted to normal in 19 after completion of the course and in 22 others two weeks later. In 25 patients the rates remained above normal at the end of the period of observation.

The radiographs of the lungs proved more satisfactory and in 109 cases showed a distinct improvement in the first week after the end of treatment. A further change was noted 3 weeks after cessation of treatment.

In only one patient, a Chinese, there was no symptomatic or eosinophilic response. 3 patients relapsed, but responded to a second course.

It is concluded that treatment with diethylcarbamazine resulted in a complete cure in all patients. As a control the effect of the drug on other eosinophilias was tried out, especially on a group of 13 children with high eosinophilia without clinical or parasitological evidence of filariasis. Although they were given the drug in syrup form in dosage of 6 mgm. per kgm. body weight 3 times daily for 5 days, no effect on the eosinophilia was observed in a period of observation of 2–12 months. One boy of six who had clinical asthma did not respond.

The aetiology remains obscure. The possibilities are that it is an infection or an allergic condition, and it may be both. The author does not discard the theory that it may be some kind of filarial infection [see the previous paper by the author and his colleagues, this *Bulletin*, 1957, v. 54, 1341]. *Philip Manson-Bahr*

Wu, Ching-Li, Liu, Erh-Hsiang & Fu. Hsiu-Cheng. [**Epidemiological Survey of Filariasis bancrofti in South Shantung, China**] *Acta Microbiol. Sinica.* 1957, v. 5, No. 3, 242–55, 4 figs. [16 refs.] [In Chinese.] English summary. [Summary taken from *Rev. Applied Entom.* Ser. B. 1958, Apr., v. 46, Pt. 4, 59.]

The results are given of an epidemiological survey of filariasis in three villages on the plain in the southern part of Shantung, which is the northernmost province of China in which the disease is known to be endemic.

The infection rate, including elephantiasis, averaged 23·78 per cent., and the parasite concerned in all cases was *Wuchereria bancrofti*. The commonest mosquitos in the district were *Culex pipiens pallens* Coq., which was particularly numerous in houses. *Anopheles hyrcanus sinensis*

Wied. and *C. tritaeniorhynchus* Giles. Dissections of mosquitos taken in human dwellings in one of the villages showed that 134 of 420 females of *C. p. pallens* contained filarial larvae and 59 contained mature ones, while only two of 22 females of *A. h. sinensis* contained larvae and these were immature. The larvae reached the third stage in females of both species, when these were reared in the laboratory and infected experimentally, but the percentages that did so were 60·87 in *C. p. pallens* and only 42·86 in *A. h. sinensis*, and it is concluded that *C. p. pallens* is the chief natural vector of *W. bancrofti* in this district.

ENGEL, R., HALBERG, F., DASSANAYAKE, W. L. P. & DE SILVA, J. **24-Hr. Rhythms in Blood Eosinophils and *Wuchereria bancrofti* Microfilariae before and after Δ1-9α-Fluorocortisol.** [Correspondence.] *Nature*. 1958, Apr. 19, v. 181, 1135–6, 1 fig.

12 patients with *W. bancrofti* infection were studied by counts of the microfilariae and eosinophils in the capillary blood every 1½ hours for 24 hours. The eosinophil count was higher at 23.00 hours than at 12.30 or 14.00, but the correlation between the two rhythms was not statistically significant. 3 patients were then given an adrenal inhibitor Δ′-9α-fluorocortisol for 3 days, and 24-hour counts of the microfilariae and eosinophils were made before and after this treatment. The excretion of 17-ketosteroids in the urine was depressed by this treatment but only slightly. The microfilarial periodicity persisted and according to the graphs given it was not greatly altered. The eosinophil counts taken on the day after treatment suggested that the patients were escaping from the adrenal cortical inhibition. From these results it is difficult to draw any conclusion about a possible relation between the adrenal cortex and microfilarial periodicity. *F. Hawking*

EDESON, J. F. B. & WHARTON, R. H. **Studies on Filariasis in Malaya: Treatment of *Wuchereria malayi*-Carriers with Monthly or Weekly Doses of Diethylcarbamazine (Banocide).** *Ann. Trop. Med. & Parasit.* 1958, Mar., v. 52, No. 1, 87–92.

The trials reported in this paper were undertaken in order to find a dosage regime suitable for mass treatment of rural populations in Malaya where *W. malayi* abounds [this *Bulletin*, 1950, v. 47, 1213].

The effects of monthly or weekly doses of diethylcarbamazine citrate in various regimes were tested out in hospital patients in E. Pahang, Malaya. The best results were obtained with 4 and 6 mgm. per kgm. once a month and 5 mgm. once weekly. By these means microfilarial counts were reduced by about 98% after only three doses. The effects upon clinical attacks have to be judged on the patients' histories. Most of them experienced a reduction in the number of attacks of fever and adenitis during the ensuing year. However, clinical attacks occurred in a few who

had not experienced them before treatment. The reactions were sometimes severe; occasionally alarming. Nearly every one showed some reaction after the initial dose. Some attacks were febrile; others took the form of headache, vomiting or dizziness, appearing usually within 12 hours. In a few patients adenitis and lymphangitis appear to have been precipitated. Reactions after the second dose also occurred in one-third, but were mild. This was surprising as many still showed high microfilaraemia. Decrease of dosage did reduce the severity, though antihistamines had no effect.

The rapid disappearance of *W. malayi* microfilariae from the peripheral blood after treatment with only a few doses of diethylcarbamazine is certainly an encouragement for mass treatment campaigns, for it is an index that these microfilariae are as susceptible as those of the Pacific form of *W. bancrofti*. There is therefore every reason to believe that the end result would be as successful as those reported by Kessel for Tahiti [see, for example, this *Bulletin*, 1954, v. 51, 503]. However, in Malaya elimination of the microfilarial reservoir in man may not halt transmission for it is known that, even when numbers of microfilariae in the blood are reduced to very low levels, the vector mosquito—*Mansonia longipalpis*—may still become infected, and a reservoir exists in forest monkeys and domestic cats. That mass treatment is not 100% efficient is shown by one person who subsequently developed elephantiasis.

Philip Manson-Bahr

Wharton, R. H. & Santa Maria, F. L. **Studies on Filariasis in Malaya: the Effect of Residual Insecticides on** *Mansonia* (*Mansonioides*) *longipalpis*. *Ann. Trop. Med. & Parasit.* 1958, Mar., v. 52, No. 1, 93–102, 1 graph. [14 refs.]

" 1. Experiments are described which compare the effect of DDT, dieldrin and gamma BHC on the behaviour and mortality in man-baited window-trap huts of *Mansonioides* mosquitoes, the vectors of filariasis due to *Wuchereria malayi* in East Pahang, Malaya.

" 2. *Mansonia* (*Mansonioides*) *longipalpis*, the main vector, formed the majority of mosquitoes in the huts, but some observations were also made on *M. uniformis* and *M. annulatus*, which are secondary vectors.

" 3. The mosquitoes entered the huts at night to bite; a few remained to rest by day, but the majority were caught in window-traps while attempting to leave before dawn the following morning. When the bait was protected by a mosquito-net a lower proportion fed, and many unfed mosquitoes were in the exit-traps by midnight.

" 4. Doses were tested of 50 and 100 mgm. dieldrin (both as wettable powders and as emulsions), 200 and 500 mgm. DDT (emulsions), and 100 mgm. gamma BHC (emulsion) per square foot.

" 5. Dieldrin at 100 mgm. per square foot was clearly superior to the other insecticides, killing 100 per cent. *M. longipalpis* for two months and maintaining a kill (24-hour) of over 50 per cent. for about six months.

"6. With 50 mgm. dieldrin, the death-rate fell below 50 per cent. in the third month after treatment, while with 100 mgm. gamma BHC, after an initial kill of 100 per cent., the death-rate fell below 50 per cent. in the fourth month after treatment.

"7. With DDT, neither the 200 mgm. nor the 500 mgm. dose killed 100 per cent. initially, and the death-rate fell below 50 per cent. in the second month after treatment with 200 mgm. and in the fifth month after treatment with 500 mgm.

"8. The 24-hour mortality of *M. longipalpis* recovered alive from a hut treated with 100 mgm. dieldrin per square foot was the same whether the mosquitoes were fed or unfed. Similarly, there was no difference in the mortality whether the bait was protected by a net or not.

"9. No insecticide had any obvious effect on the behaviour of *M. longipalpis* in treated huts, except that DDT somewhat reduced the biting rate during the first month after treatment.

"10. Though the numbers of *M. uniformis* and *M. annulatus* were small, the effect of the insecticides on them appeared to be very similar to the effect on *M. longipalpis*.

"11. A few *Culex pipiens fatigans* were found in huts treated with 100 mgm. dieldrin per square foot, and a kill of more than 80 per cent. was recorded 5–6 months after treatment.

"12. The results of the experiments are briefly discussed in relation to their possible bearing on the control of filariasis transmitted by *Mansonioides* mosquitoes."

DUKE, B. O. L. **Studies on the Biting Habits of *Chrysops*. V.—The Biting-Cycles and Infection Rates of *C. silacea*, *C. dimidiata*, *C. langi* and *C. centurionis* at Canopy Level in the Rain-Forest at Bombe, British Cameroons.** *Ann. Trop. Med. & Parasit.* 1958, Mar., v. 52, No. 1, 24–35, 5 figs. [14 refs.]

Nocturnal periodicity of *Loa* in drills (*Mandrillus leucophaeus*) in forests of the British Cameroons stimulated search for night-biting *Chrysops* [this *Bulletin*, 1955, v. 52, 1117]. 24-hour catches were made on a platform at 85 feet height in a virgin forest where several species of *Chrysops*, infected drills and infected canopy-dwelling monkeys (*Cercopithecus nictitans martini* and *C. mona mona*) were known to be plentiful. The catches were conducted periodically over 2 years. *C. silacea* and *C. dimidiata* (the Bombe form—an atypical form with some points of resemblance to *C. silacea* and replacing typical *C. dimidiata* in Bombe where this work was done) were diurnal in activity in the canopy, with a peak in the morning and the late afternoon. *C. langi* and *C. centurionis* were active, biting at dusk and early hours of the night. No adult specimens of *C. longicornis*, known to be present from larval breeding places, were taken. Limited observations on seasonal abundance indicate, for *C. langi* and *C. centurionis*, a principal season of adult activity at the

end of the rains (mid-November to mid-December); it is admitted that these findings are based on human bait and may not reflect quite the true state of affairs for natural seasonal biting activity on monkey and drill.

Infection rates for *Loa* in flies were 4·7% and 3·0% in *C. silacea* and *C. dimidiata* respectively, but as high as 12·6% and 31·8% respectively in *C. langi* and *C. centurionis*. The numbers of worms in *C. silacea* and *C. dimidiata* were high (averages per fly of about 80) but much lower (between 11 and 26) for *C. langi* and *C. centurionis*.

It is concluded that little, if any, transmission of *Loa* between monkey and drills is effected by the diurnal *C. silacea* and *C. dimidiata*, but that the crepuscular biting time of the arboreal *C. langi* and *C. centurionis* is better adapted to the take-up of the nocturnal microfilariae of the simian loiasis from quiescent or sleeping monkeys and drills. The infection indices in these two fly species are also consistent with, as is known to be the case, high incidence of microfilaraemia but low individual microfilarial densities in the simian population. The infections in *C. silacea* and *C. dimidiata* at Bombe are likely to be of human loiasis. As elsewhere, these species frequent ground level to attack people in villages and houses, and 10–12% of the human population show microfilariaemia of loiasis at Bombe. *D. S. Bertram*

Crosskey, R. W. & Crosskey, M. E. **Filarial Infection in *Simulium griseicolle* Becker.** [Correspondence.] *Nature*. 1958, Mar. 8, v. 181, 713.

This is an interesting report of a filarioid infection in *Simulium griseicolle* collected on windows of a rest-house at Lokoja, Northern Nigeria. 4 of 321 flies dissected contained infective larvae and 3 others harboured "sausage" forms in the thoracic muscles. The flies are not known to feed on man in this endemic area for human onchocerciasis. The worms in the flies seem likely, on size comparison with corresponding stages of *O. volvulus* in *S. damnosum*, to be of some other filarioid. It is suggested that the filarioid worm may possibly be a parasite of local ducks. Host-parasite association of this kind is known in Canada, and *S. griseicolle* sometimes occurs in clouds around ducks at Lokoja.

[See also this *Bulletin*, 1957, v. 54, 855, 1114.] *D. S. Bertram*

Trans. Roy. Soc. Trop. Med. & Hyg. 1958, Mar., v. 52, No. 2, 95–127, 4 coloured figs. on 2 pls. & 5 text figs. [40 refs.] Discussion 128–34. **Symposium on Onchocerciasis.**

A. R. D. Adams in his Introduction (pp. 95–96) said that practising physicians in Britain, dealing with many persons indigenous to or visiting West Africa, were bound to encounter cases of onchocerciasis. The diagnosis was often made fortuitously during routine examination. Until recently, no effective treatment except nodulectomy was possible, and the bulk of European patients did not develop any disabilities as a result of

their continuing infections. He had reported the case of one European with grave eye lesions, but did not recall having seen others. Many dermal lesions formerly ascribed to onchocercal infection, including craw-craw, were now considered to be of other causation. Nevertheless, severe allergic skin eruptions were attributed to this and other filariases. Considerable numbers of Europeans from West Africa reported for examination for " river-blindness ". Their alarm was real, but unjustified in view of the extreme rarity of onchocercal ocular complications in such people.

A. W. Woodruff, S. Bell, D. S. Ridley & F. D. Schofield (*Clinical, Diagnostic and Therapeutic Aspects of Onchocerciasis*, pp. 97–108) said that the clinical features of onchocerciasis, particularly of early and light infections, were incompletely known and presented apparent contradictions. In the authors' series of 76 patients, 72 of whom were Europeans, ocular lesions occurred in 26. By contrast the incidence of ocular complications might be very low in African areas in which the rate of heavy infestation was nearly 100%, *e.g.*, Calabar and Lower Volta, Ghana. It was notable that both were coastal areas with high rainfall in contrast to the dry dustiness of the inland areas in which high blindness rates were reported. A possible cause of the difference was complication of onchocerciasis by dust-borne diseases or ocular diseases most readily transmitted in a dry climate.

Onchocerciasis was being encountered in Great Britain with increasing frequency. In 1956, 25 proven cases were seen at the Hospital for Tropical Diseases, London, compared with 6 in 1952. This was partly because many more people from Britain were working in the rapidly developing country of Eastern Nigeria and the Cameroons. An analysis was presented of the clinical and epidemiological features of 76 proven cases of onchocerciasis. Findings in 59 unproven cases, not included in the analysis, were similar. Since effective chemotherapy was now known to be available, the present tendency was to seek treatment early. 16 patients, completely free from symptoms, were diagnosed by routine investigation, etc. The incidence of ocular involvement, often an early presenting manifestation, was 34·2%. No similar lesions were found in 37 random patients from endemic areas examined as controls. Pruritus was the presenting symptom in 52 patients, in 33 of whom it affected only the buttocks and back. In 35 it was associated with a rash. Pruritus was less common in those who had long resided in the endemic area. Average period of residence of symptom-free patients was 15·2 years, compared with 8·2 for those with ocular lesions. Perhaps there was a link between the three observations (1) of symptom-free patients of long residence in the endemic areas, (2) of indigenous people with long-standing infections and minimal ocular involvement, and (3) of Europeans with early or light infections, shorter overseas residence, and ocular involvement. The link might be the gamma globulins.

In only 18 patients were nodules present. Their presence or absence bore no relation to duration of residence overseas. Microfilariae were

found in 76 patients but not in 59 others with very good evidence of infection. Ancillary aids to diagnosis were therefore important. In the 76, the skin test was positive in 77%, the complement-fixation test in 63%. In 67% there was eosinophilia of 10% or more, but there was no correlation between the three tests. The allergic reaction that followed injection of diethylcarbamazine was specific only for filariasis in general, and the drug killed microfilariae that might otherwise be identified.

Treatment with diethylcarbamazine had been used as a routine since 1948. Results, though good, had left room for improvement, and recently suramin had been given in addition. Allergic manifestations, relieved somewhat by Anthisan [mepyramine], constantly followed the beginning of treatment. If the initial dose were low, it was very rarely necessary to modify the course of treatment. Eye drops of 5% cortisone acetate might be useful. In 2 cases recurrence of symptoms necessitated 4 courses of treatment; these had now been followed up for 19 and 33 months without further recurrence. It seemed probable that repeated courses of diethylcarbamazine ultimately effected radical cure. Although suramin appeared to augment the effect of diethylcarbamazine its use alone was unsatisfactory. 27 patients were given suramin and in 5 instances treatment was stopped when albuminuria developed. Diethylcarbamazine was considered to be the drug of choice for clinical onchocerciasis, particularly in the presence of keratitis. Ocular lesions when present resolved rapidly.

F. Hawking (*Chemotherapy of Onchocerciasis*, pp. 109–111) said that diethylcarbamazine and suramin were at present the only effective drugs. The former was issued as a dihydrogen citrate containing only half its weight of base. Dosages reported should indicate whether they referred to the base or the salt. No fatal complications from its use had ever been reported. It usually destroyed microfilariae in the skin within a few days, but had little effect on adult worms. Allergic reactions during treatment might be severe, and were not greatly influenced by antihistamine drugs, but might be diminished by cortisone. Suramin, well known as a treatment for trypanosomiasis, was usually effective in killing adult worms, after which the microfilariae disappeared gradually. The dose for an adult was 1 gm. weekly intravenously for 5 weeks, or in heavily infected or resistant cases for up to 10 weeks. These doses should not be exceeded. Other compounds tested in the laboratory—arsenicals, pentavalent antimonials and cyanine 863—had proved toxic or ineffective or both. The practical treatment of onchocerciasis varied according to circumstances. Suramin was suggested for expatriates, unlikely to be reinfected and without eye lesions: those with eye lesions should receive a graduated course of diethylcarbamazine followed by a course of suramin to kill the adult worms. Persons liable to reinfection should receive diethylcarbamazine perhaps in courses repeated every 6 months to keep down the infection, or even small doses every month. For mass campaigns in rural areas neither drug is ideal. Diethylcarbamazine produced

too intense reactions and was not effective in destroying the adult worms. [Its administration presents difficulties usually insuperable.] Suramin, the only possible drug at present, might cause toxic reactions, but had given good results, *e.g.*, in Northern Ghana, and was worth further trial in courses of 5 weekly injections each of 1 gm.

D. P. Choyce (*Some Observations on the Ocular Complications of Onchocerciasis and their Relationship to Blindness*, pp. 112–121) said that he had studied onchocerciasis patients in England, with other causes of ocular damage excluded, and in the Cameroons, where nutrition was good and trachoma absent. An embryological plane of cleavage just deep to Bowman's membrane was continued in the cornea, of which the anterior third was continuous with the conjunctiva, the posterior two-thirds being of mesodermal origin. Microfilariae migrated into the cornea along this plane, and when dead gave rise to small symptomless opacities. In a severe case these might become confluent or even vascularized. Left untreated individual opacities disappeared in about a year; their presence was therefore an indication of active infection. In his experience they had comparatively little effect on vision, but he was prepared to accept that in a trachomatous country the two diseases might potentiate each other's corneal damage. He disagreed with the views of Rodger [this *Bulletin*, 1958, v. 55, 95] that punctate keratitis in the tropics was usually due not to onchocerciasis but to virus keratitis complicating a fever; detailed reasons were given for regarding onchocercal keratitis as pathognomonic of the disease. Onchocerciasis was not a cause of cataract, except in those rare cases where the iritis was so severe that posterior synechiae formed and a complicated cataract resulted. Iritis to the [early] stage of the pear-shaped pupil was seen in 4 patients in the Cameroons. Visual damage was due mainly to secondary glaucoma, a complication seen in 1·5% of Cameroons patients.

Diseases of the posterior segment tended to be those of the brain, and not, like onchocerciasis, of the skin. Scepticism was expressed as to past findings of *Onchocerca* microfilariae in the posterior segment. Two main types of posterior lesion were ascribed to onchocerciasis in the literature, optic atrophy and choroidoretinal degeneration. Optic atrophy was seen in 26% of blind eyes in the Cameroons. Possible causes were methyl alcohol poisoning, vitamin B deficiency, occlusions of the central retinal artery, hereditary optic atrophy, demyelinating nervous diseases and syphilis. 5 patients blind from choroidoretinal degeneration and others with earlier stages of degeneration were seen in the Cameroons. A strong impression was gained that the condition was an hereditary abiotrophy, due to inbreeding in a community in which little influx of fresh genetic material was believed to have occurred during this century. A similar condition occurred in the United Kingdom, *viz.*, generalized choroidal sclerosis, transmitted generally by a dominant gene. This gene, occurring coincidentally with onchocerciasis, could cause pockets of blindness in Africa. The author's experience in London and the Cameroons failed to

confirm the widely held belief that onchocerciasis was a serious blinding disease. With intense infection anterior segment lesions might result in blindness, but posterior segment lesions had multiple different causes, particularly a genetic one. In one patient in London anti-filarial treatment coincided with marked improvement in a choroiditis; there was some doubt that this was a true case of ocular onchocerciasis.

W. E. Kershaw (*Relation between Infection with Onchocerca volvulus and Eye Lesions*, pp. 122–127) described and illustrated the pattern of distribution and intensity of microfilariae in the skin [see Kershaw *et al.*, this *Bulletin*, 1954, v. 51, 1279]. Microfilariae reached the anterior chamber of the eye either from a head nodule or after spreading to the head following an increase of intensity of infection. Anterior segment lesions were related to the intensity of the infection in the head and neck. Posterior segment lesions were not related to the intensity of infection, as shown by frequency distribution histograms of patients with and without eye lesions. Posterior segment lesions had been associated with *O. volvulus* infections, but there had been no clear statement that they were confined to endemic areas of onchocerciasis. Alternative explanations, genetic, etc., of posterior eye lesions should be investigated. Should they be merely accidentally associated with infection, they were unlikely to be influenced by control measures.

A lively discussion revealed considerable scepticism towards the views of the principal speakers. C. C. Chesterman wondered if the choroid might suffer similarly to the melanophores of the skin, in achromia due to onchocerciasis, and believed that microfilariae remained in the same cutaneous lymphatic area where they were born. A. B. Raper described gross metabolic changes, without any certainty about their pathogenesis. B. B. Waddy, having worked on onchocerciasis in the worst endemic area for 10 years, still regarded it as causing mass blindness and craw-craw, and as a cause of cataract. J. H. Walters pointed out that demyelinating diseases were extremely rare in tropical Africa, that alcoholism could be excluded in many endemic areas, that syphilis was an urban rather than rural disease, and that the scattered distribution of a dominant gene was unlikely; *e.g.*, retinitis pigmentosa was rare in Africa. J. L. McLetchie observed that in one village carefully investigated in the Cameroons the blindness may be genetic, " but it would appear to me most peculiar if the same genetic cause were operating in the northern areas of onchocercal blindness, unless one could postulate that it was due to a most unusual gene transmitted by the simulium fly ".

B. B. Waddy

Ruiz Reyes, F. Estado actual de las lesiones oculares oncocercosas. [**Present Position regarding Ocular Lesions in Onchocerciasis**] *Medicina*. Mexico. 1957, Dec. 25, v. 37, No. 786, 573–9.

The author, from Mexico, discusses the ocular lesions in onchocerciasis, which may be mild, acute, subacute, chronic and severe. The severe

lesions tend more to occur in adult males, but in general ocular lesions may occur in adults and children, in men and women. The different stages, manifestations and methods of treatment are tabulated briefly.

During 1957, the author has made ophthalmological studies of more than 2,600 cases, mostly in the State of Oaxaca. He has observed that regular treatment, consisting of extirpation of nodules and administration of diethylcarbamazine every 3 months, which has been undertaken in certain areas for more than 4 years, has resulted in a considerable decrease of ocular lesions. The milder lesions, in particular, have diminished and in consequence deterioration has been checked. Blindness has decreased in recent years and now does not seem to exceed more than 200 cases, although there is still much chronic visual defect. "

In 1938, among 50,000 cases of onchocerciasis, ocular lesions amounted to between 60% and 70%, of which 20% were severe. Today, only about 5% are severe and the ocular lesions in general have diminished.

In 5 tables the author shows the findings in different parts of the State between 1948 and 1957. The numbers treated are indicated and a comparison between the years 1948 to 1950 on the one hand and 1957 on the other, in 8 districts, clearly shows the diminution in the incidence of severe lesions and of residual visual defects. *H. J. O'D. Burke-Gaffney*

Stoner, R. D. & Hankes, L. V. *In vitro* **Metabolism of DL-Tyrosine-2-C-14 and DL-Tryptophan-2-C-14 by** *Trichinella spiralis* **Larvae.** *Exper. Parasit.* New York. 1958, Mar., v. 7, No. 2, 145–51.

See this *Bulletin*, 1958, v. 55, (676).

Gibson, T. E. **The Transmission of Trichinosis by Butchers' Knives.** *Ann. Trop. Med. & Parasit.* 1958, Mar., v. 52, No. 1, 48–50.

" The ingestion of raw or insufficiently cooked pork or pork products is without doubt the common source of human infection with *Trichinella spiralis*. Semple, Davis, Kershaw and St. Hill (1954) [this *Bulletin*, 1954, v. 51, 822] however, suggested that certain cases of human trichinosis which occurred in Liverpool during the autumn of 1953 were referable to infection carried on butchers' knives or on the hands after handling infected meat or sausage. Although the circumstantial evidence was strong, there seemed to be no experimental evidence to support this suggestion, and the following small experiment was therefore carried out to test its validity.

" Multiple incisions were made into the musculature both of freshly killed and of 40-hour-old carcases of guinea-pigs known to be heavily infested with the larvae of *Trichinella spiralis*. Small numbers of larvae were recovered from the knives used on five out of eight occasions." It is probable that the infection transmitted to man by such means would be mild. *W. E. Kershaw*

Markell, E. K. **The Effect of Cortisone Treatment upon the Longevity and Productivity of *Trichinella spiralis* in the Rat.** *J. Infect. Dis.* 1958, Mar.–Apr., v. 102, No. 2, 158–61. [17 refs.]

"Sixty Wistar rats were infected with 5000 larvae of *Trichinella spiralis* each. Following infection, forty rats were treated with cortisone, while twenty were left as untreated controls. Animals were sacrificed at intervals up to 14 weeks after infection, and examined for the presence of adult worms in the intestine and larvae in the musculature. Treatment was continued in the experimental group until the animals were killed. Adult worms were present in extremely small numbers or were entirely absent in control animals examined during the second to fourth week of the experiment, while treated animals harbored a much greater number of worms, which did not seem to become appreciably reduced during the first eight weeks of treatment. Adult worms persisted, though in reduced numbers, in animals examined as long as fourteen weeks after infection. Larval counts done on the two groups indicated that the treated animals developed approximately 9·7 times as many larvae in their muscles as did the controls."

[See this *Bulletin*, 1958, v. 55, 438.]

DEFICIENCY DISEASES

West African Med. J. 1958, Mar., v. 7 (n.s.), No. 1, 3–51, 8 coloured figs. on 2 pls., 14 text figs. & 1 map. [Numerous refs.] **Report on the Nutritional Conference, Ibadan, September, 1957.**

The Nigerian branch of the British Medical Association are to be congratulated on organizing a most successful nutrition conference in Ibadan in September 1957. Further, they have succeeded in getting the proceedings published remarkably quickly [albeit at the cost of some editorial inaccuracies: there is an appendix to Dr. B. M. Nicol's paper, but no paper; Dr. Nicol is credited with a remark in the discussion although it is specifically stated he was not present at the symposium].

The Conference was fortunate to get the assistance of two distinguished visitors from overseas, Dr. Cicely D. Williams and Dr. Emmet Holt. There were 16 delegates from Nigeria representing medicine, agriculture and education. The chairman was a paediatrician, Dr. W. R. F. Collis, who ably introduced and summed up the proceedings. About half the delegates were Nigerians and the other half Europeans now resident in that country. The reader is at once struck by the obvious harmony between these two groups; the first brought detailed information of Nigerian village

life and the second added technical knowledge, and the conference successfully blended these into practical policies. If more conferences were possible on these lines there would be no need for worry about the future of Africa and indeed no " African problem ".

Dr. Cicely Williams is now the established apostle of the Maternity and Child Health Services in underdeveloped countries. She preaches the need for more paediatricians and nurses for these services. Doctors and nurses can gain the confidence of the people by their achievements in curative medicine; they are then in a unique position to carry out the health education that is so essential for preventive medicine. Dr. Williams sets out these views with the clarity that only comes from wide experience.

Dr. Holt read two papers. The first dealt with protein requirements. He reviews the evidence, obtained from experiments in the U.S.A., showing that the minimum requirements of essential amino acids expressed as mgm. per kgm. are some ten times greater in infants than in adults. However, he considers that in addition to supplying these minimal needs the diet must provide additional nitrogen. A lack of total nitrogen is probably more important than lack of any specific amino acid in causing diseases such as kwashiorkor. Proper timing in the use of foods will make the available protein go much further. Mixtures of the incomplete vegetable proteins should be eaten at the same meal together with protein sparers, fat and carbohydrate.

In his second paper Dr. Holt considers the treatment of diarrhoea. He points out that it has long been orthodox to treat diarrhoea by limiting food intake. This *therapy of sparing* increases the caloric deficiency and so promotes undernutrition. He gives many figures to show that if diarrhoea is treated with high caloric diets, although losses in the stools are increased the proportion of the food lost in the stools is not necessarily greater. Higher intakes lead to more food being absorbed. The conclusion is that the diarrhoea so commonly found in kwashiorkor is an indication for more, not less, calories in the diet.

The general discussion ranged freely over medical, agricultural and educational matters. There was general agreement that beans were the cheapest and best source of vegetable protein available, but there were many difficulties in popularizing them and making them available. One speaker said that though he agreed that the demand for better food is closely linked with better education, a more rapid improvement in the nutritional standards could be achieved by better transport and marketing facilities than by lessons on nutrition in schools. Should the educational effort be concentrated in the schools, or through maternity and child health services or, as one speaker suggested, " scattered widely through schools, churches, information services, newspapers and wireless " ? There is an obvious limit to the amount of money available for these purposes in Nigeria. Hospitals, preventive medical services, education and transport facilities must unfortunately compete with each other with

their legitimate claims. This discussion should help Nigerian leaders in establishing priorities.

The proceedings of the symposium give a clear and concise account of some of the fundamental problems facing Nigeria. All who took part may be congratulated on a successful venture. *R. Passmore*

Money, G. L. **Endemic Neuropathies in the Epe District of Southern Nigeria.** *West African Med. J.* 1958, Mar., v. 7 (n.s.), No. 1, 58–62.

This paper records clinical studies in two villages in Southern Nigeria. In Poka 250 adults out of a total population of 1,100, and in Iraye Oke 63 adults out of a total of 454 were examined. In Poka 76 people were diagnosed as suffering from organic disease of the nervous system and in Iraye Oke 34. The clinical features were optic neuropathy, sensory polyneuropathy, sensory ataxia with or without overt posterior column physical signs, pyramidal disturbances, auditory neuropathy and hoarseness. In Poka a large proportion of the inhabitants complained of subjective sensory disturbances and it was difficult to assess these critically. Females were more affected than males and all ages over 10 were involved.

There is little doubt that this neurological disorder, so common in this district of Nigeria, is very similar to if not identical with the neuropathies described by Cruickshank [this *Bulletin*, 1957, v. 54, 741] in Jamaica. In both villages angular stomatitis, glossitis, scrotal dermatitis and blepharitis, attributable to deficiency of the B group of vitamins, were common. This supports the suggestion that the disease may be of dietary origin. The author is cautious in discussing aetiology and points out the need for detailed biochemical appraisal of the patients. *R. Passmore*

Garcia Alonso y Medina, H. El síndrome de recuperación nutricional en niños con desnutrición crónica primaria de tercer grado de tipo atrófico. [**The Syndrome of Nutritional Recovery in Children with Chronic Atrophic Malnutrition of the Third Degree**] *Medicina*. Mexico. 1957, Apr. 10, v. 37, No. 769, 147–57, 7 graphs. [18 refs.] English summary.

A study of malnutrition in infants has been in progress at the Infants' Hospital of Mexico since 1949.

Malnutrition in infants has received a variety of names including pellagra, beriberi, kwashiorkor, the hypoprotein avitaminoses, famine oedema and atrophic malnutrition. (Atrophic malnutrition as such does not appear in the International Classification of Diseases 1955.)

The paper deals with 33 infants of an average age of 22 months, weighing less than half the normal weight for their age, admitted to the

hospital and surviving for over a week. They had no oedema and no pellagral skin lesions. 6 similar infants died within a week of admission.

Tables and graphs show the weekly gains in weight and changes in serum protein compared with 320 malnourished infants with oedema. Comparisons are also made of liver enlargement, protuberant abdomen, ascites, venous abdominal network, blood albumin and alpha, beta and gamma globulin.

The conclusion is reached that there is no essential difference between the oedematous and atrophic infants; both are low in serum albumin and high in gamma globulin and in both the return to normal after admission to hospital is similar. *Allen Daley*

HAEMATOLOGY

Panse, M. V. & Gokhale, S. K. **Blood Glutathione and its relation with Haemoglobin and Red Blood Cell Count in Tuberculosis, Leprosy and Diabetes. Part II.** *Indian J. Med. Res.* 1958, Mar., v. 46, No. 2, 159–70, 9 graphs. [15 refs.]

The two authors have published previously [this *Bulletin*, 1956, v. 53, 232] an account of the glutathione content of the blood in normal Indian subjects and of its relation to haemoglobin level and red blood cell count. The present paper deals with the examination of 107 Indian subjects with tuberculosis, 91 with leprosy and 61 suffering from diabetes. Although the haemoglobin level and the red cell count were lower in the patients with tuberculosis and leprosy, the glutathione content of the blood was higher than in the normal subjects. There was no difference from normal in the glutathione content of the blood in diabetic patients. Average total glutathione was in normal subjects (determined previously) 41·25 mgm.%, in tuberculosis 47·77 mgm.%, in leprosy 45·33 mgm.% and in diabetes 41·76 mgm.%.

The authors discuss the contradictory results published for glutathione values in diabetes. A number of workers found them to be lowered, while others—like the present authors—found them to be normal.

H. Lehmann

Soares, A. D. & Parreira, F. Tempo de vida do eritrócito normal. Seu emprego no estudo e diagnóstico de algumas hemopatias. [**The Life Span of Normal Erythrocytes and its Use in the Study of Certain Blood Diseases**] *Gaz. Méd. Portuguesa.* 1957, Nov.–Dec., v. 10, No. 6, 743–60, 15 figs. [52 refs.] English summary.

Matthias, J. Q. **The Absence of Abnormal Haemoglobins in 500 Out-Patients in Britain.** *J. Clin. Path.* 1958, May, v. 11, No. 3, 265.

Jonxis, J. H. P., Huisman, T. H. J., da Costa, G. J. & Metselaar, D. **Absence of Abnormal Haemoglobins in some Groups of the Papua Population of Dutch New Guinea.** [Correspondence.] *Nature.* 1958, May 3, v. 181, 1279.

The authors, from Groningen, the Netherlands, refer briefly to the finding of abnormal haemoglobins in different countries, with special reference to the Far East.

They now report a study of paper electrophoresis and column chromatography on 135 blood samples of East Indonesians from Ambon and other islands who had come to Holland, and on 250 samples from Papuans collected in Dutch New Guinea. No abnormal haemoglobin was found. Malaria is holoendemic in many parts of New Guinea, but the spleen index among adults there is far higher than it is in adults in the holoendemic areas in Africa. The authors pose the question whether this high spleen index in the adult Papuan is related to the absence of abnormal haemoglobins among them. *H. J. O'D. Burke-Gaffney*

Pauling, L. C. Emoglobine anormali in rapporto alle malattie. [**Abnormal Haemoglobins in relation to Disease**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1958, v. 21, Pt. 1, 30–48. 13 figs.

Cabannes, R. Recherches sur les hémoglobines humaines et animales en Algérie. [**Studies on Human and Animal Haemoglobins in Algeria**] *Algérie Méd.* 1957, July, v. 61, No. 7, 751–87, 29 figs.

Sproule, B. J., Halden, E. R. & Miller, W. F. **A Study of Cardiopulmonary Alterations in Patients with Sickle Cell Disease and its Variants.** *J. Clin. Investigation.* 1958, Mar., v. 37, No. 3, 486–95. [24 refs.]

"Unsaturation of the arterial blood has been demonstrated in 16 out of 21 patients possessing S hemoglobin in various combinations.

"By measuring A-a gradients on three levels of oxygenation, it has been determined that the desaturation is principally the result of intrapulmonary shunting of blood, although defects in diffusion also exist.

"Increased cardiac outputs and blood volumes were accompanied by generally decreased pulmonary vascular resistances, suggesting that cor pulmonale is not common in these states.

" The administration of very low concentrations of oxygen (9 to 11 per cent), while producing increased sickling in both the arterial and venous circulation, resulted in no discernible acute or chronic symptomatology."

MacIver, J. E., Went, L. N. & Cruickshank, E. K. **Sickle Cell-Thalassemia Disease in Jamaica.** *Blood.* 1958, Apr., v. 13, No. 4, 359–66, 3 figs. [30 refs.]

This paper is concerned with the description of 2 people and their families in whom electrophoresis of the haemoglobin showed the sickle-cell anaemia pattern but whose family studies showed that the condition could not be homozygous. Both were women, one 15 and one 28 years old and of mixed African and Chinese extraction; neither was well. The haemoglobin levels were 8·3 and 10·6 gm.% respectively and there was some evidence of sickle-cell disease in both. In the first propositus it was possible to show that the father, a Chinese, was a carrier of the thalassaemia gene and the mother a carrier of the gene for sickling. In the case of the second patient the father, again a Chinese, had unfortunately died but it must be accepted as highly unlikely that he could have been a carrier of the sickling gene. There is no doubt that the first woman suffered from sickle-cell thalassaemia and it is reasonably certain that the same applied to the second.

This paper provides new evidence for the importance of family studies to confirm the diagnosis of homozygous sickle-cell anaemia because it is possible that haemoglobin A production can be completely suppressed in the phenotype in cases of sickle-cell thalassaemia. *H. Lehmann*

Ager, J. A. M. & Lehmann, H. **Observations on some " Fast " Haemoglobins: K, J, N, and " Bart's ".** *Brit. Med. J.* 1958, Apr. 19, 929–31, 4 figs. [17 refs.]

Those who have followed the isolation of haemoglobin variants in the last decade will have been struck by the increasing complexity of the subject, and perhaps bewildered by the minutiae on which claims for the distinction of haemoglobin types have been based. The means of characterizing a haemoglobin have increased and now include: free electrophoresis and electrophoresis on paper and in starch or agar gels, at *p*H values ranging from 6·2 to 9·0; chromatography on ion-exchange resins; solubility studies; spectrographic analysis; spontaneous or alkali-induced denaturation; and (most fundamentally) structural analysis to indicate the amino-acid content and sequence. Usually only a few of these means have been used by the time a new variant has been announced, with the result that some false identifications and false distinctions are now becoming apparent. Especially with zone electrophoresis on paper (which has been so widely used) identification depends on careful and repeated comparisons between samples, under constant conditions. As more

samples of the newer haemoglobin variants become available, and are exchanged between interested workers, it may be expected that the collecting zeal of the last few years will be succeeded by a re-appraisal of the known types, in preparation for a synoptic account of the whole field.

The present paper is welcome as one of those inaugurating this second phase. It clears up some points regarding the haemoglobins named in its title, and others with which their relation has been in doubt.

Haemoglobin K. The authors compared their own sample [this *Bulletin*, 1957, v. 54, 1118] with 8 others sent to them, and found no difference on paper and starch electrophoresis; further, the original sample was identical with that of Cabannes and Buhr (*Pédiatrie*, 1955, v. 10, 888), which had been temporarily designated I and then J. Finally, the authors' haemoglobin K was shown to be identical with the Liberia II of Robinson *et al.* (*Blood*, 1956, v. 11, 902). This last identification is of interest in that the only outstanding difference between K and Liberia II —the fact that the former did not separate from haemoglobin A in mixtures at acid *p*H, whereas Liberia II did—disappeared when the mixtures tested were adjusted to contain comparable proportions of the two components.

Haemoglobin N. This designation, at one time reserved for Liberia II if it should prove not to be K, was automatically freed by the above demonstration. The authors now apply it to a component in 2 blood samples from West Africa, and to the Liberia I of Robinson *et al.* These specimens were at first thought to contain haemoglobins A and J, but after examining examples of J from America, Africa, and Asia, the authors found that the latter were all identical, but different from their own specimens. The new West African specimens however were indistinguishable from Liberia I, and their fast component, now called N, was distinguished by a mobility between that of J and that of H at *p*H 8·6 on paper, and less than that of A at *p*H 6·5.

Bart's haemoglobin. This eponym is applied to a variant described here for the first time. It was present to the extent of 24% in the haemolysate of a 4-week baby, together with 40% of A and 36% of F, separating readily from the A + F band on paper electrophoresis at *p*H 8·6, and occupying the position of haemoglobin N, though at *p*H 6·5 its mobility was less than that of N. Most remarkably, when the Bart's haemoglobin was separated by elution, it was found on ultra-violet spectrography to show the tryptophan notch hitherto thought to be peculiar to haemoglobin F; and it was also resistant to alkali to the extent of leaving a 50% residue after 1 minute in the standard test. It was also noteworthy that the new component was not present in the blood of either of the baby's parents. Speculation on the significance of this new haemoglobin is wisely kept to a minimum, as it cannot yet be known whether it will disappear as the child ages, or whether it will be found to contain both adult and foetal elements; moreover it is possible that its appearance is linked with the inheritance of the thalassaemia gene in this family.

The paper ends with two annotated diagrams that summarize present knowledge of the electrophoretic behaviour of known haemoglobin variants.

Alan B. Raper

VENOMS AND ANTIVENENES

Turk, J. L. **Observations on Snakes and Snake Bite in the Eastern Mediterranean Area.** *J. Roy. Army Med. Corps.* 1958, Apr., v. 104, No. 2, 63–70.

The author gives a brief account of the available information regarding the non-poisonous and poisonous snakes of the areas of Israel, Egypt and Cyprus in which he was stationed. In the regions north from Jerusalem, the only common poisonous snakes are *Vipera lebetina* and *V. palaestina*. To the south are found *Cerastes cerastes* and *C. vipera*, *Pseudocerastes fieldi*, *Echis colorata* and *Atractaspis engaddensis*, and the Elapidae, *Naja naja* and *Walterinnesia aegypti*.

A short description follows of the properties of snake venom and of the clinical course of snake bite. The incidence of snake bite in Israel is quoted, but without original observations. In discussing treatment the author points out that polyvalent antivenenes prepared by the Pasteur Institute are available, one of which contains antitoxins against *Echis carinatus*, said to be effective against *E. colorata*. *B. G. Maegraith*

Izard, Y. & Boquet, P. Recherches sur les venins de *Vipera xanthina palestinae* et d'*Echis carinata*. [**Studies on the Venom of** *Vipera xanthina palestinae* **and** *Echis carinata*] *Ann. Inst. Pasteur.* 1958, May, v. 94, No. 5, 583–9. [11 refs.]

The English summary appended to the paper is as follows:—

"*Vipera xanthina palestinae* excretes a venom which differs from that of *Vipera lebetina* from North Africa by the absence of *in vitro* coagulating activity towards horse plasma. It possesses certain antigens in common with the venoms of *Vipera aspis*, *Bitis arietans* and *Echis carinata*.

"The venom of *Echis carinata* is less noxious than that of the same Viperidae studied in Kindia by Lefrou and Martignolles, but both venoms have comparable physio-pathological properties. However, the venom studied by the authors seems to possess certain antigens which are not present in the venom of the *Echis* captured in Western Africa."

Bowers, E. F. & Hall, G. H. **The Separation and Properties of an Anticoagulant Principle from Russell's Viper Venom.** *Brit. J. Haematol.* Oxford. 1958, Apr., v. 4, No. 2, 220–27, 6 figs. [12 refs.]

See this *Bulletin*, 1955, v. 52, 574.

Khalil, F., Abou-El-Naga, I. & Riad, Z. M. **Effect of Cobra Venom on Leucocytes.** *Amer. J. Physiol.* 1958, Apr., v. 193, No. 1, 86–8, 1 fig.

"Intermittent injections of sublethal doses of the venom of Naja haje of Egypt caused temporary leucopenia followed by leucocytosis in guinea-pigs and rabbits. There was always a rise in the percentage of neutrophil leucocytes and a corresponding drop in the percentage of lymphocytes. The leucocytes of both types of animals exhibited morphological signs of phagocytosis and degeneration."

Yang, Chen-Chung. **On the Mechanism of the Inhibition of Crystalline Glyceraldehyde-3-Phosphate Dehydrogenase by Formosan Snake Venoms.** *J. Formosan Med. Ass.* 1958, Jan., v. 57, No. 1, 29–42, 7 figs. [22 refs.]

Smith, F. D., Miller, N. G., Carnazzo, S. J. & Eaton, W. B. **Insect Bite by *Arilus cristatus*, a North American Reduviid.** *Arch. Dermat.* 1958, Mar., v. 77, No. 3, 324–30, 4 figs. [29 refs.]

The habits, appearance and distribution of *Arilus cristatus* are briefly reviewed and a case of a 10-month-old boy being bitten by this insect described. The painful nature of the bite of *Arilus* is emphasized and in the case described this appeared to last for some minutes after the insect had been removed; there were no severe effects from the bite, the local reaction consisting of an area of faintly erythematous oedema 3 to 4 cm. in diameter. Other cases of people having been bitten by *Arilus*, which normally feeds on insect larvae, are mentioned [Hall, this *Bulletin*, 1924, v. 21, 789]. *E. R. Nye*

TOXOPLASMOSIS

Dragomir, Constanța. Transmission et isolement d'une souche de toxoplasme humaine chez la souris blanche. [**Transmission and Isolation of a Human Strain of *Toxoplasma* in White Mice**] *Arch. Roumaines Path. Expér. et Microbiol.* 1957, June, v. 16, No. 2, 309–16, 8 figs.

8 cases of toxoplasmosis were diagnosed in children in Jassy, Rumania, by finding the organism, and in 1 case, a strain of the parasite was isolated by inoculating the cerebrospinal fluid (containing numerous organisms) intraperitoneally into white mice. In the first passage the mice did not become ill, and it was not until the fifth intraperitoneal passage that the

ordinary degree of virulence was attained, with the mice dying in 5 days. But intracerebral passage (after the first intraperitoneal one) increased the virulence immediately, and the mice died with a generalized infection. In the early passages, giant forms of the organism, measuring 14–16 μ, were seen, and it is suggested that these forms were in process of extracellular multiplication. *P. C. C. Garnham*

Rodriguez R., C. & Sucre, A. Toxoplasmosis congénita. Presentación de un caso. [**A Case of Congenital Toxoplasmosis in Venezuela**] *Archivos Venezolanos Puericult. y Pediat.* 1957, July–Sept., v. 20, No. 65, 217–23, 5 figs. on 3 pls.

Bobowski, S. J. & Reed, W. G. **Toxoplasmosis in an Adult, presenting as a Space-Occupying Cerebral Lesion.** *Arch. Pathology.* 1958, Apr., v. 65, No. 4, 460–64, 4 figs. [29 refs.]

"A case of cerebral toxoplasmosis has been described, occurring in an adult and presenting as a space-occupying intracranial lesion. An excised granulomatous lesion was diagnosed as toxoplasmosis by histologic and serologic means. The literature is briefly summarized. To our knowledge no adult case has previously been reported presenting with cerebral signs and symptoms."

Simitch, T., Pétrovitch, Z., Bordjochki, A. & Pop-Cénitch, S. L'infection expérimentale du chien avec *Toxoplasma gondii* par la voie buccale. [**Experimental Infection of the Dog with *Toxoplasma gondii* by Oral Route**] *Arch. Inst. Pasteur d'Algérie.* 1957, Dec., v. 35, No. 4, 368–71.

[A more accurate title for this paper would be to substitute "stomach route" for "oral route" because infection was invariably carried out by introducing the parasite directly into the stomach by rubber tube.] 21 dogs were given suspensions of *Toxoplasma gondii* (derived originally from a dog and maintained in ground squirrels) by stomach tube and were killed at various intervals to observe the incidence of infection. This was never detected directly but only by subinoculation of organs into clean ground squirrels, and only 5 of the dogs were found to be positive, the details being as follows:—

1. Puppy aged 6 months was killed on 24th day: mixed suspension of liver, lung and spleen proved infective.

2. Puppy aged 20 days was found dead on 9th day: mixed suspension of liver, lung, spleen and mesenteric glands proved infective.

3. Puppy aged 12 days was killed on 16th day: suspension of mesenteric glands (but not of brain) proved infective.

4. Puppy aged 12 days was killed on 31st day: suspension of mesenteric glands (but not of spleen and liver) proved infective.

5. Puppy aged 12 days was killed on 10th day: suspension of mesenteric glands (but not of spleen or liver) proved infective.

The 16 remaining dogs (including 10 under 3 weeks of age) were negative.

[The authors state that although these experiments show that dogs may sometimes be infected by the oral route, the factors governing infection remain unknown. Lainson (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1958 (*in the press*)) has pointed out that ingestion of the organism in the form of the pseudocyst is probably the critical point—and it is unlikely that the suspensions used by these workers contained such forms because they were taken from squirrels in the acute stage of the disease. It would be interesting to see the experiment repeated with suspensions obtained from chronically infected animals.] *P. C. C. Garnham*

DERMATOLOGY AND FUNGUS DISEASES

Londoño González, F. La Blastomicosis Sudamericana en Colombia. [**South American Blastomycosis in Colombia**] *Rev. Facul. de Med.* Bogotá. 1957, Mar.–Apr., v. 25, Nos. 3/4, 101–18, 2 figs.

A review of the literature, with tabulated details of 18 cases including 3 new cases seen by the author.

Fonseca, J. B. Blastomicose Sul-Americana. Estudo das lesões dentárias e paradentárias sob o ponto de vista clínico e histopatológico. [**South American Blastomycosis. Study of the Dental and Paradental Lesions from the Clinical and Histopathological Points of View**] [Thesis]. 182 pp., 20 figs. on 17 pls. [Numerous refs.] English summary (4 loose-leaf mimeographed pp.). 1957. São Paulo.

The source and mode of infection in South American blastomycosis (Lutz's disease) have not yet been clearly established. However, the frequent occurrence of early or apparently the initial lesions of the disease in the mouth in persons accustomed to chewing grass stems or leaves, or cleaning the teeth with raw twigs, seems to indicate that the causative fungus, *Paracoccidioides brasiliensis*, may be present on such vegetable materials. It is suggested that *P. brasiliensis* may become established in the periodontal tissues and the tartar and cause a pyorrhoea-like condition, and it is evident that carious teeth may provide a portal of entry leading to systemic infection. Trauma of the glossal or buccal mucosa

by a contaminated, carious tooth may provide an additional portal for the infection.

The author's study of 25 cases of the disease bore out the hypothesis of a probable relationship between the infection and the habit of grass or leaf-chewing, but the use of twigs for cleaning the gums was often prompted by the irritation of already existing disease. The first manifestation of the gingival or paradental infection may be painful ulceration of the gums, haemorrhage and loosening of the affected teeth, but in many cases the signs are merely hyperaemia, oedema, a tendency to bleeding, retraction of the gums and the formation of periodontal pockets. In such cases the condition is often treated as trivial until, or unless, the characteristic framboesia-like gum lesion of Lutz's disease develops. Cases diagnosed clinically and radiologically as simple periodontitis, have proved, on histological examination, to be Lutz's disease. The X-ray picture of extensive alveolar bone destruction without obvious cause, may arouse suspicion of *P. brasiliensis* infection, especially if the root apex is involved and a zone of reactive sclerosis is seen underlying the area of bone destruction. Nevertheless, the diagnosis of blastomycosis must rest on the results of histological and mycological examinations, or the existence of generalized Lutz's disease. In all suspected cases carious teeth should be removed and treatment with sulphonamides instituted immediately.

The attention of dental practitioners in the endemic regions of Lutz's disease should be directed to the possibility of early infection by *P. brasiliensis* as a cause of dental disease. *J. T. Duncan*

MISCELLANEOUS DISEASES

O'Connor, H. & Issa, D. Splénomégalie dangereusement hyperfonctionnelle au cours d'une grossesse gémellaire. [**Severe Hyperfunctional Splenomegaly in a Twin Pregnancy**] *Méd. Trop.* Marseilles. 1958, Mar.–Apr., v. 18, No. 2, 373–5, 1 fig.

Gelfand, M. & Kaplan, M. **Bantu Coronary Insufficiency. Report of a Possible Case.** *Central African J. of Med.* 1958, Apr., v. 4, No. 4, 157–9, 1 fig.

Baxter, Barbara. **Erythropoietic (Congenital) Porphyria in a Bantu Girl.** *Central African J. of Med.* 1958, Apr., v. 4, No. 4, 148–53.

"The case presented is of a Bantu girl of three years suffering from congenital porphyria. All the classical signs of the disease were present.

Porphyrin excretion was high. Following splenectomy, the haemolytic anaemia was improved and porphyrin excretion lowered."

[See this *Bulletin*, 1956, v. 53, 808, 932.]

Szeinberg, A., Asher, Y. & Sheba, C. **Studies on Glutathione Stability in Erythrocytes of Cases with Past History of Favism or Sulfa-Drug-Induced Hemolysis.** *Blood.* 1958, Apr., v. 13, No. 4, 348–58, 1 fig. [18 refs.]

Szeinberg, A., Sheba, C. & Adam, A. **Enzymatic Abnormality in Erythrocytes of a Population Sensitive to *Vicia faba* or Haemolytic Anaemia induced by Drugs.** *Nature.* 1958, May 3, v. 181, 1256.

See also p. 899, Marneffe. Note clinique sur une association rhino-sclérome-lèpre. [**Association of Leprosy with Rhinoscleroma**]

PARASITOLOGY: GENERAL

Neghme R., A. & Silva C., R. Distribución y frecuencia de las entero-parasitosis en Chile. [**Distribution and Incidence of Intestinal Parasitism in Chile**] *Rev. Servicio Nacional de Salud.* Santiago. 1956, Dec., v. 1, No. 2, 131–54, 5 graphs. [11 refs.]

The extensive studies of parasitism in Chile by Professor Neghme and his colleagues will be familiar to readers of this *Bulletin* [see, for example, this *Bulletin*, 1952, v. 49, 47; 1953, v. 50, 512; 1954, v. 51, 1274, 1275; 1955, v. 52, 449, 485, 635; 1956, v. 53, 221]. The authors now describe at length a study made between 1948 and 1954 in 108 localities. For the purpose, they divide the whole area of the country into its 5 geographical zones (desert, plain, thicket, forest and southern) and define the different climatic and vegetational features in each, which affect the results. Tables and figures show the results of stool examinations for each zone, for each of the common intestinal parasites and for age-groups. The results and their significance are discussed fully.

17,219 persons were examined. Intestinal parasites were commonest in early life and the incidence fell after the age of 30. The common protozoa were found throughout the territory. *E. histolytica* was commonest in the central region (18%) and where population was dense. The incidence of *Giardia* fell from north to south. The incidence of

Ascaris and *Trichuris* was related to the degree of humidity in the atmosphere and increased from north to south, reaching as high as 50% to 60% in zone IV. *Hymenolepis* was more apparent where rats were present, *e.g.*, in the north and central ports and in the neighbourhood of large cities in the central zone.

The presence of the parasites was related to such usual factors as water supply, presence of flies and rodents, irrigation of vegetables, disposal of excreta, and education, and the variation in these factors in the different zones is discussed. 75% of the people have unsatisfactory water supplies and 17% are illiterate.

The detailed statistical results of the findings would require to be studied for an adequate picture to be obtained of the incidence of each type of parasite in relation to zones and ages. Percentages for the whole country in the case of *E. histolytica*, *Giardia*, *Ascaris* and *Hymenolepis* were respectively 12·91, 11·47, 33·4 and 5·51.

This is a highly informative study. *H. J. O'D. Burke-Gaffney*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Imms, A. D. **A General Textbook of Entomology including the Anatomy, Physiology, Development and Classification of Insects.**

This book was reviewed on p. 840.

Lumsden, W. H. R. **A Trap for Insects biting Small Vertebrates.** *Nature*. 1958, Mar. 22, v. 181, 819–20, 1 fig.

The attractiveness of small animals for mosquitoes is difficult to assess if a human catcher has to remain by the animal to collect any mosquitoes which land on the "bait". This difficulty can be overcome if an automatic trapping device is used.

The trap used consisted of a truncated cone of acetate sheet, with centimetre gaps between the pieces of acetate forming the cone, which was placed over a cage holding the bait animal. To the top of the cone was fixed a "Vent-Axia" 12 in. fan. Above the fan a metal cylinder led to a wire gauze funnel and collecting bottle. Intermittent action of the fan was obtained by using an alarm clock, the minute hand of which trailed a wire over an interrupted circular aluminium strip in the circuit. The trap was found effective in use and caught a significantly larger number of mosquitoes in the presence of bait than when the bait was absent. *E. R. Nye*

See also p. 857, Bertram *et al.*, **Mosquitoes of the Colony and Protectorate of the Gambia.**

Australia, Western. **Report of the Commissioner of Public Health for the Year 1956** [Henzell, L.]. 106 pp. **Appendix VIIa. A Survey of the Mosquito Fauna of the Southern Parts of Western Australia** [Britten, E. J.]. pp. 64–82, 8 figs. & 6 maps. 1958. Perth: Alex B. Davies, Govt. Printer.

The surveys were made during the years 1955 and 1956, attention being concentrated upon the larvae, though adults were collected when seen.

The territory was divided into 8 zones, each of which was surveyed separately. In addition, surveys were also made in the vicinity of Onslow and Leonora because of heavy unseasonal rains, and along the Eyre highway.

Altogether 29 species of mosquitoes were recorded from 88 places. *Anopheles annulipes* and *A. atratipes* were the only anophelines found, the former being most prevalent and the latter confined to the south-west corner. There were 6 species of *Culex*, of which *C. pipiens australicus* was the most prevalent and widespread; *C. fatigans* though equally widespread was the main nuisance mosquito in towns. From this region 13 named species of *Aëdes* were collected, of which *A. alboannulatus* was the commonest. Specimens of 6 other *Aëdes* species are being examined and will be described later.

Notes are given on the species, their distribution is shown on maps and breeding places are illustrated by photographs. *H. S. Leeson*

Chang, Tsong-Pao, Sun, Tao & Wu, Ching-Foo. [**Observations on the Blood Feeding Habits and the Time of Activities of the Common Species of Mosquitoes in Dairen**] *Acta Microbiol. Sinica*. 1957, v. 5, No. 2, 189–95, 2 figs. [In Chinese.] English summary. [Summary taken from *Rev. Applied Entom.* Ser. B. 1958, Apr., v. 46. Pt. 4, 58–9.]

The total numbers of mosquitoes of seven species collected while attacking man, cows, horses, sheep and fowls in selected quarters of Dairen in the summer of 1954 and (in brackets) the approximate percentages taken on man were 4,125 (9) of *Culex pipiens pallens* Coq., 2,420 (3·5) of *Aëdes dorsalis* (Mg.), 1,909 (1·8) of *C. tritaeniorhynchus* Giles, 626 (2·1) of *A. vexans nipponii* (Theo.), 391 (1) of *A. togoi* (Theo.), 50 (2) of *Anopheles hyrcanus sinensis* Wied. and 22 (22·7) of *C. bitaeniorhynchus* Giles. Cows were the preferred hosts of all species except *C. p. pallens*, of which 75·7 per cent. were taken on fowls, and *Aëdes togoi*, of which 23·5 and 49·6 per cent. were taken on fowls and horses, respectively.

Observations were made on the feeding activity of the four more

abundant species in each hour from 4–5 p.m. to 6–7 a.m. Each species showed two peaks of activity, with the first higher than the second. The first was at 7–8 p.m. and the second at 3–4, 4–5 and 5–6 a.m., respectively, for *tritaeniorhynchus*, *nipponii* and *dorsalis*, but those for *pallens* occurred between 11 p.m. and 4 a.m. and were separated only by one hour's inactivity at 2–3 a.m.

Edmunds, L. R. **Field Observations on the Habitats and Seasonal Abundance of Mosquito Larvae in Scotts Bluff County, Nebraska (Diptera, Culicidae).** *Mosquito News.* 1958. Mar., v. 18, No. 1, 23–6.

"Twelve species of mosquitoes were found breeding in Scotts Bluff County, Nebraska during 1953. Listed in order of abundance they were: *Culex tarsalis*, *Aedes dorsalis*, *Culiseta inornata*, *Aedes vexans*, *Aedes nigromaculis*, *Aedes trivittatus*, *Culex pipiens*, *Culex restuans*, *Culex salinarius*, *Culex territans*, *Anopheles walkeri*, and *Uranotaenia sapphirina*. The first five species constituted 99 percent of the larvae and pupae collected.

"During 1953 *Culex tarsalis* was found developing from May 7 to October 29, *Aedes dorsalis* from June 3 to October 8, *Culiseta inornata* from April 21 to November 26, *Aedes vexans* and *Aedes nigromaculis* from June 3 to September 13.

"Most of the mosquito production occurred in seepage areas and temporary surface pools associated with irrigation. In the seepage areas *Culex tarsalis* was the most abundant mosquito and was commonly found in association with *Culiseta inornata*. In the temporary surface pools *Aedes dorsalis* was dominant and was generally associated with *Aedes vexans* and *Aedes nigromaculis*. Permanent control of mosquitoes in Scotts Bluff County will involve the elimination of seepage areas and surface pools on irrigated pastures."

Bar-Zeev (Wolfinsohn), M. **The Effect of Density on the Larvae of a Mosquito and its Influence on Fecundity.** *Bull. Res. Counc. of Israel.* 1957. Oct., v. 6B, Nos. 3/4, 220–28, 1 fig. [12 refs.]

Above a certain minimum amount (0·60 gm. per 30 larvae), increase in the amount of food (yeast) has no effect on larval development. Below this level development is slowed down.

Delayed development of larvae under crowded conditions was found to be due to lack of food. Larvae reared under crowded and non-crowded conditions, but with the same amount of food per larva, developed at the same rate and showed the same mortality provided that the water was renewed to prevent the formation of a film of yeast on the surface. There was no indication that metabolites affected development or mortality.

Antibiotics enhanced the development of larvae at low (0·1–0·2 gm. per 30 larvae) and delayed it at normal concentrations of food.

Adults reared from underfed larvae were smaller and of lower fecundity than those from well-fed larvae. The cause, or one of the causes, of the lower fecundity was the smaller amount of blood ingested by these females. *R. J. Wood*

Colless, D. H. **Recognition of Individual Nulliparous and Parous Mosquitoes.** [Correspondence.] *Trans. Roy. Soc Trop. Med. & Hyg.* 1958, Mar., v. 52, No. 2, 187.

This letter reports that in 3 species of *Culex* and in *Aëdes albopictus* in Malaya, parous females can be distinguished from nulliparous individuals by the presence of pigmented dilations (corpora lutea) in the ovarioles of the ovaries of the parous females. These are detectable at about 200× magnification by simply flattening the ovaries in saline on a microscope slide after their removal from the insect. About 200 females can be examined in a day by one person.

[There is much interest at the present time in the prospect of being able to tell, with considerable accuracy, the age of individual female mosquitoes. Russian workers, as early as 1947, showed that this could be done for anopheline mosquitoes if the time required to produce a batch of eggs was known and a count made of the number of corporea lutea in an ovariole, since each corpus luteum represented a previous oviposition. Translations by Dr. M. T. Gillies of the salient Russian papers are summarized by him in this *Bulletin*, 1958, v. 55, 713. Dr. Colless' independent studies with culicines are of great interest. Although the letter does not claim more than a convenient way of rapid grouping of females into those which have and have not laid eggs, it appears from several points briefly mentioned that prospects of determining the age of the culicine mosquitoes studied are good. The fuller publication of the results which is to follow will be valuable.] *D. S. Bertram*

Larsen, J. R. **Hormone-Induced Ovarian Development in Mosquitoes.** *Science.* 1958, Mar. 14, v. 127, 587–8, 1 fig.

Previous work [this *Bulletin*, 1956, v. 53, 1060; 1957, v. 54, 627; 1958, v. 55, 223] has shown that ovarial development in mosquitoes is under hormonal control. Undeveloped ovaries of *Culex pipiens* were removed from 5–7-day-old females, and transplanted into recently emerged *C. molestus*. 4 days later the *C. molestus* host females were dissected, and the transplanted ovaries were found to be fully developed. A similar result was obtained when undeveloped ovaries of *Aëdes aegypti* were transplanted into *C. molestus*. Corpora allata removed from *C. molestus*

and transplanted into 5–7-day-old, unfed *C. pipiens* induced ovary development. Ovaries removed from *C. molestus* and transplanted into unfed *C. pipiens* did not develop. The evidence suggests that young unfed *C. molestus* are able to release a hormone from the corpora allata which stimulates ovary development, whereas *C. pipiens* cannot release this hormone without the stimulus of a blood meal. The hormone will stimulate ovary development in other species and also other genera of mosquitoes. *B. R. Laurence*

MATTINGLY, P. F. **Species Hybrids in Mosquitoes.** *Trans. Roy. Entom. Soc. of London.* 1956, Apr. 10, v. 108, Pt. 2, 21–36, 3 figs. [Numerous refs.]

Both natural and experimental hybridization of mosquitoes of the *Culex pipiens* complex, the *Aëdes scutellaris* group, and between *Aëdes aegypti* and *Aëdes albopictus* are discussed in this paper with a view to emphasizing the opportunities which exist for genetic and related studies on such insects, which are of a kind quickly and readily bred in large numbers, of great medical interest, and with interesting geographical distributions. Much of the paper is specialized, concerned with interpretations of problems arising from the genetic work which has already been done. Doubt is expressed as to the existence of purely cytoplasmic inheritance of maternal characters in *Aëdes aegypti–Aëdes albopictus* crosses and perhaps in other hybridizations. There is a useful amount of information on the distribution of some of the mosquitoes, particularly various members of the *Culex pipiens* group. *D. S. Bertram*

BLANTON, F. S. & PEYTON, E. L. **Notes and Distribution of *Aedes* Mosquitoes in Panama based on a Three Year Light Trap Survey.** *Mosquito News.* 1958, Mar., v. 18, No. 1, 30–33.

"This is the third of a series of small papers on the distribution of Panama mosquitoes based on light trap surveys conducted in Panama by the 25th Medical Detachment, during 1951 to 1953 inclusive. *Aedes aegypti*, the classical vector of yellow fever has not been collected for some time. The scope of this paper included only adults; however it is noted that the larvae of *Aedes fulvus* were collected for the first time in Panama during the period of these studies. Other species of *Aedes* may or may not be responsible for the transmission of jungle yellow fever in Panama as well as *Haemagogus* spp.

"The distribution of those species taken in our light traps is given. To date nine species have been taken in our light traps and six additional species by other means. Dr. Galindo, of the Gorgas Memorial Laboratory, has collected two more species that are not listed from Panama. This makes a total of 17 known species in Panama and there are additional species in the *A. terrens* complex."

See also p. 882, Surtees, **Laboratory Studies on the Survival of the Eggs of *Aedes* (*Stegomyia*) *aegypti* under Adverse Conditions.**

See also p. 880, Mattingly, **Genetical Aspects of the *Aëdes aegypti* Problem. II.—Disease Relationships, Genetics and Control.**

Lewallen, L. L. & Brydon, H. W. **Field Tests with Organo-Phosphate Granular Insecticides against Mosquito Larvae in Lake County, California.** *Mosquito News.* 1958, Mar., v. 18, No. 1, 21–2.

"Under conditions comparable to those experienced in these experiments Guthion could be used at 0·5 lb./acre, or Dylox at 1·0 lb./acre, in granular form for successful control of both *Culex tarsalis* and *Anopheles freeborni*. Dylox would be preferred to Guthion in situations where it is desirable to preserve predators of mosquito larvae."

See also p. 925, Crosskey & Crosskey, **Filarial Infection in *Simulium griseicolle* Becker.**

Beck, Elisabeth C. **A Population Study of the *Culicoides* of Florida (Diptera: Heleidae).** *Mosquito News.* 1958, Mar., v. 18, No. 1, 6–11. [10 refs.]

"To summarize briefly, six light traps were operated at regular intervals in different areas of Florida in order to learn something of the relative and seasonal abundance of the various *Culicoides* species. Of the 25 species taken during this study, 14 were taken in large enough numbers to indicate that they contribute to the sand fly annoyance problem. On the coastal regions *furens*, *canithorax*, *melleus*, and possibly *loughnani* in some regions, are the problem. Inland, *inamollae* in South Florida, and *crepuscularis* and *haematopotus* in northern Florida appear to be the most abundant species."

Davis, A. N., Gahan, J. B., Fluno, J. A. & Anthony, D. W. **Larvicide Tests against Blackflies in Slow-Moving Streams.** *Mosquito News.* 1957, Dec., v. 17, No. 4, 261–5.

Field investigations were conducted to evaluate DDT, dieldrin and parathion for the control of blackfly larvae in sluggish streams draining swamps in south-eastern United States.

In Florida, 5-minute applications of parathion at 0·5 and 1·0 p.p.m. eliminated all larvae for 0·6 to 1·6 miles, while treatments for up to 24 minutes failed to give good control at 2·3 or 6 miles. In South Carolina 10- to 20-minute applications of parathion at 0·5 and 1 p.p.m. gave 100% reductions at 0·24 and 2·8 miles. In both States DDT at 1 p.p.m. for

10 and 20 minutes was effective for not more than 0·28 mile. Dilution of the insecticides in the large and small pools present in streams of this type was undoubtedly a factor in destroying their effectiveness.

A 5% solution of DDT in fuel oil applied by aeroplane to 11- and 4-square mile plots at 2 quarts per acre gave 95–99% control for 2 weeks and then gradually lost its effectiveness. Aerial application of granules containing 7% dieldrin on attapulgite at 0·04 pounds of dieldrin per acre eliminated blackfly larvae for 2 weeks and the control remained considerably above 90% through 4 weeks. *R. J. Wood*

Liu, Su-Yung, Chen, Hsi-Hsuan & Lien, Jih-Ching. **A Brief Study of the Bionomics of Fly Breeding in Keelung City, Taiwan.** *J. Formosan Med. Ass.* 1957, Oct., v. 56, Nos. 9/10, 417–25.

Musca domestica vicina, *M. sorbens*, *Chrysomyia megacephala* and *C. rufifacies* were found to be the commonest flies visiting homes, restaurants and food shops in a seaport town of Taiwan. The principal breeding places of *M. d. vicina* were garbage dumps and containers, and animal excrement, whereas *M. sorbens* was found to be closely associated with human excreta, both exposed out of doors and in nightsoil tanks and privies. Larvae found in pit privies and nightsoil tanks usually belonged to *C. megacephala*, or to *Sarcophaga*. These flies also bred in garbage and slaughterhouse offal. Details of the fly breeding places, and records of other flies bred from garbage, faeces and similar breeding places, are set out in 5 tables. [This study emphasizes the importance of *Chrysomyia* as a possible vector of excremental diseases in the Orient.]

B. R. Laurence

Bettini, S. Osservazioni sul grado di sensibilità di *Musca domestica* L. verso il malathion nella zona di Chianciano dopo quattro anni di trattamento. [**Observations on the Degree of Susceptibility of *Musca domestica* to Malathion in the Chianciano Area after 4 Years of Treatment**] *Riv. di Parassit.* Rome. 1958, Jan., v. 19, No. 1, 73–8, 1 fig. [16 refs.]

The Chianciano (Siena, Italy) region referred to comprises about 120 farms and a small thermal spa; a map shows the buildings distributed along a curved strip about 4 km. long. In 1948 to 1950 house-spraying was done with DDT and, in 1950, lindane was used. By this time the chlorinated compounds were useless for fly control and were abandoned. From 1953 to 1957 malathion was used, being sprayed inside (and partly outside) stables, pigsties and kitchens. Manure containers were sprayed but not the dung itself.

In 1957 samples of flies from the treated area and some from outside it were taken and bred in the laboratory. Simple tests on the F_1 progeny showed no increase in resistance in the treated zone. This result contrasts

with those reported by other authors from other regions where organophosphorus compounds have been used against flies. It may be due to (i) the small extent of the treated zone, (ii) the fact that the insecticide was only used against adult flies, not against larvae, (iii) the fact that simultaneous measures were taken to reduce breeding sites for flies.

[See also this *Bulletin*, 1958, v. 55, 337 *bis*.] *J. R. Busvine*

Bervoets, W., Bruaux, P., Lebrun, A. & Ruzette, A. La lutte contre *Chrysomyia putoria* à Léopoldville, et apparition de phénomènes de résistance. [**Control of** *Chrysomyia putoria* **in Léopoldville, Belgian Congo, and Development of Resistance**] *Acad. Roy. Sci. Coloniales Bull. des Séances.* Brussels. (n.s.) 1957, v. 3, No. 6, 1148–51.

Since 1951 larvae of *Chrysomyia putoria* breeding in latrines, septic tanks and similar sites in the city of Léopoldville, have been subjected to the action of a number of insecticides.

Attempts to control the insect with some chlorinated hydrocarbons proved unsuccessful and indicated a natural resistance to BHC and dieldrin. DDT was more effective but did not give complete control.

Initial results with Diazinon proved more encouraging. Used as a larvicide at 2 gm. per water-closet applied every 12 days, it reduced the incidence of larvae to more than one-sixth of its original level in 5 months. However, within a year the treated larvae had become strongly resistant and also showed a cross resistance to parathion and chlorthion. But malathion still worked well and for 5 months good results were obtained at 700 p.p.m. After this period the flies developed a resistance to this compound, meanwhile regaining a certain sensitivity to Diazinon and chlorthion.

A further larvicide to be used was Pyrolan, a derivative of urea. This proved very effective but less so against flies previously exposed to Diazinon. *R. J. Wood*

Aoki, T. **Histological Studies on the So-Called Stylostome or Hypopharynx in the Tissues of the Hosts parasitized by the Trombiculid Mites.** *Acta Med. et Biologica.* Niigata. 1957, Nov., v. 5, No. 2, 103–20, 11 figs. on 2 pls. [62 refs.]

Studies From Inst. Med. Res. Federation of Malaya No. 28, pp. vii + 471, numerous figs. [Numerous refs.] 1957. Kuala Lumpur. [42s.; $6.00.] **Malaysian Parasites XVI–XXXIV.** [Edited by J. R. Audy.]

Papers XIX to XXXI (excluding XXX) of this volume are on the systematics and taxonomy of trombiculid mites and variously under the joint or separate authorship of workers whose names have long been

associated with intensive field and laboratory work in this group—Audy, Womersley, Traub, Vercammen-Grandjean and others. A new genus, *Vercammenia*, and a new species within it, are described from larvae parasitic on amphibians (XIX) and a new species of *Whartonia* from fruit bats (XX); a revised key to *Helenicula* species is given, with certain new species from Hong Kong (XXI); original descriptions of nymphs bred from larvae are to be found in different parts of this series, as for some species of *Trombicula* (XXII) and *Ascoschongastia* (XXX). There is a key to 35 species of *Gahrliepia* (subgenera *Gahrliepia* and *Schongastiella*) in south-east Asia, with descriptions of six new species of this genus (XXV); a new genus *Traubacarus* of 10 new species is described (XXVI). These are intranasal parasites of rodents. A key to them is provided. A substantial paper (XXVIII) gives larval keys to *Gahrliepia* (subgenus *Walchia*) of south-east Asia and includes descriptions of 12 new species. A few new species—of several genera—are described in XXIX. Two papers (XXIV and XXIII) offer revisions of, respectively, the genus *Heaslipia*, including some African material, and the genus *Euschongastia*; new species are also described in the former, and a subgenus in the latter. Noteworthy to the non-specialist is the revision and supplementation of the Trombiculidae of the Asiatic-Pacific region as originally monographed in 1952 by Womersley [this *Bulletin*, 1952, v. 49, 942]. This revision (XXVII) by Womersley and Audy is in the form of a check-list without figures, except for those for the description given for a new species of *Siseca*, a new subspecies in *Trombicula*, and some new nymphal descriptions. *Trombicula* is one of 24 genera. One of the subgenera of *Trombicula—Leptotrombidium*—contains *T.* (*L.*) *akamushi* and *T.* (*L.*) *deliensis*. The total of species in the family of Trombiculidae in the region in question is over 250. (The diacritical marks, it is noted, commonly in use for some of the names within this group are now omitted following recommendation to that effect by the International Commission on Zoological Nomenclature at its Copenhagen meeting.) Minor changes in the key of the original monograph are discussed in the text of this revision, but the key itself is not repeated.

Throughout these papers the descriptions are fully detailed and supported by many excellent line drawings.

Harrison (XXX) discusses further observations on the duration of attachment by feeding larvae. Most species seem to detach at night, possibly owing to rat activity, and feeding attachment is shorter if a host is heavily infested. This may indicate disturbance in crowded mites by those detaching first. An effect of this kind, if ever shown to affect viability and, ultimately, female fecundity, might well account for mite-islands of a single species which succeeds in crowding out others. Bionomics and distributional records are given (XXXIII, also by Harrison) for the principal Malaysian vertebrates (except birds and fish) which are of interest as hosts, or possible hosts, of the parasites dealt with in these collected papers.

Audy, editor of this volume, concludes with an annotated review of the literature (XXXIV) which is valuable in its record of, and comment on, relevant papers outside this series of publications. A small paper (XVII) describes four new species of fleas, not all from Malaya. The book is well bound, and indexed. [For abstracts of Nos. XVI, XVIII and XXXII on culicine mosquitoes, ticks and helminths respectively, see this *Bulletin*, 1958, v. 55, 828; 530; and below.] *D. S. Bertram*

Kohls, G. M. **Malaysian Parasites—XVIII. Ticks (Ixodoidea) of Borneo and Malaya.** *Studies from Inst. Med. Res. Federation of Malaya.* 1957, No. 28, 65–94. [Numerous refs.]

Thirty-one species of ticks are recorded from these territories, although not all occur in both countries. The species list comprises *Ornithodorus* from caves, and one or more species of *Ixodes*, *Haemaphysalis*, *Rhipicephalus*, *Boophilus*, *Amblyomma*, *Aponomma* and *Dermacentor* sp. Keys to genera and species (male and female keys) are given and notes on systematic detail under species. The genera *Haemophysalis* with 14 species and *Amblyomma* with 6 species are the best represented of the several genera. *Argas* is as yet unreported. *D. S. Bertram*

Brown, A. W. A. **The Insecticide-Resistance Problem. A Review of Developments in 1956 and 1957.** *Bull. World Health Organization.* Geneva. 1958, v. 18, No. 3, 309–21. [Numerous refs.]

"The author reviews the growth of the insecticide-resistance problem throughout the world during the period between July 1956 and November 1957, and the developments in research on the subject during the same period.

"Three new resistant species have been discovered—*Anopheles subpictus*, *Chrysomyia putoria* and *Rhipicephalus sanguineus*—and eight new types of resistance in already resistant species have been observed. Moreover, the geographical area covered by certain resistant insect populations has considerably increased.

"The research accomplishments during the period under review include: systems of detecting resistance in the field by standard test methods; confirmation of two distinct types of resistance to chlorinated-hydrocarbon insecticides in mosquitos and bed-bugs as well as in houseflies; evidence that DDT-resistance in the housefly, *Anopheles sundaicus* and *Aëdes aegypti* is due mainly to a single genetic factor associated with the ability to dehydrochlorinate DDT, and that dieldrin-resistance of *Anopheles gambiae* also derives from a single factor present even in untouched populations; a fuller understanding of the physiological mechanism of

BHC-resistance in the housefly; and demonstration that selection pressure from organo-phosphorus compounds induces resistance to themselves and to chlorinated-hydrocarbon insecticides."

Afifi, S. E. D. **Insect Resistance to Insecticides.** *J. Egyptian Pub. Health Ass.* 1958, v. 33, Nos. 1/2, 3–12. [16 refs.]

A general account.

Sanborn, C. C. & Hoogstraal, H. **Some Mammals of Yemen and their Ectoparasites.** *Fieldiana: Zool.* 1953. Dec. 30, v. 34, No. 23, 229–52.

About 25 species of mammals—shrew, several bat species, fox, leopard (from mountainous parts), hyena, hare, 9 rodent species (including *Rattus rattus* and *Mus musculus bactrianus*), gazelle and hyrax—are reported with useful notes on numbers, distribution, environment, and in certain cases colour and measurements. Ectoparasites include nycteribids on bats, various mites including *Dermanyssus muris*, *Onithodorus* [? sp.] on house mice, hard tick species of *Rhipicephalus*, *Hyalomma*, *Haemaphysalis*, *Amblyomma* from various animals, and also a few flea species including dog flea, human flea and *Xenopsylla cheopis*. There are indications for rat control in certain cities where rat numbers and flea infestations are high. Further investigations are recommended, particularly on the widely distributed common jird (*Meriones*), the grass rat (*Arvicanthis*), hares and gerbils and their ectoparasites. *D. S. Bertram*

MISCELLANEOUS PAPERS

Williams, Cicely D. **Social Medicine in Developing Countries.** *Lancet.* 1958, Apr. 26 & May 3, 863–6; 919–22.

Medicine in Europe is, for the most part, focused on institutions, and that in developing countries on disease, with emphasis on mass survey, mass treatment, mass feeding and mass sanitary measures. Though immediately productive of results these have little influence on the standards of living, education and responsibility which are the true background of health. The reason lies primarily in the faulty training of the European graduate but also in the ease of the mass technique and the temptations of specialization—which have an historical justification in

Europe, but not elsewhere. The need of the developing countries is for medical services and for medical people who individually have a broad outlook and accept curative, preventive and social functions. The whole-time health educators, nutrition workers, or research workers are no substitute for doctors and nurses who will stay long in the country, acquaint themselves closely with the people, learn their backgrounds, gain their confidence and stay to treat and follow up results of treatment. The causes of disease are not invariably abstruse, nor the remedies economically or scientifically impossible. Malnutrition may be due to a variety of factors but one of them, and a common one, is improvidence in social custom, which results in a multitude of wasteful uses. Experiments in social welfare have often been over-ambitious; recreation centres have been built before child welfare centres, and these before treatment centres. Experiments have also perhaps overlooked the strains of adjustment to a changing pattern of life which may be severe and call for social medicine and an enlightened educational system.

The essential feature of vital statistics in these countries is that the death rate among children may well be 50 times as high as that of the United Kingdom, and concentration on this point, with discovery of the reasons for the excess, and the development of ameliorative measures, are the most important aspects of medicine today. Scientific medicine has much to contribute to these countries but its mistaken application can lead to frustration of purpose as, for instance, in interminable repetition of surveys. It is through the balanced expansion of the child health services that its most important contribution can be made.

[A forthright and robust description of social medicine, much of which is applicable to undeveloped and developed, as well as developing countries.] *G. Macdonald*

Stuart, K. L., Bras, G., Patrick, S. J. & Waterlow, J. C. **Further Clinical and Investigative Uses of Liver Biopsy. An Analysis of Five Hundred Twenty-Seven Biopsies.** *Arch. Intern. Med.* 1958, Jan., v. 101, No. 1, 67–83, 1 fig. [50 refs.]

In 330 patients, mostly Negroes, including 84 diagnosed as veno-occlusive disease, 78 as kwashiorkor, marasmic kwashiorkor or marasmus, 16 as vomiting sickness and 18 as sickle-cell anaemia, 527 liver biopsies were performed.

Biopsy material was examined histologically after fixation in Helly's fluid. Chemical analyses, which included estimation of total fat and water, glycogen, nucleic acids (DNA and RNA) and nitrogen, were performed in specimens from 109 patients (kwashiorkor 45, marasmus 13, veno-occlusive disease 34, miscellaneous 17).

Liver function tests were carried out as far as possible within 24 hours of biopsy. Tests included: one minute and total serum bilirubin; thymol

turbidity, serum cholinesterase, serum protein, serum alkaline phosphatase, prothrombin, bleeding and clotting times.

Histological study of biopsy material revealed familiar patterns as follows:

Veno-occlusive disease: in acute cases there was subendothelial swelling of the intima of the small hepatic veins, with massive centrilobular congestion and some associated parenchymal cellular damage. In subacute cases, centrilobular fibrosis occurred with collateral circulation through neighbouring sinusoids. In chronic cases there was non-portal fibrosis.

Kwashiorkor and marasmus: fatty changes were seen in both, but in cases of kwashiorkor "every liver cell is filled almost to capacity with fat", with predominantly peripheral distribution. Some scattered eosinophilic cytoplasmic degeneration with cellular infiltration was observed in some cases. There was also some cellular infiltration of the portal triads. Previous reports indicate that fibrosis did not develop in patients followed up. This point is being further studied.

Vomiting sickness: the characteristic complete absence of glycogen was observed.

Sickle-cell anaemia: In 9 of 18 cases, sickled cells were seen in the sinusoids. The parenchymal cells were unaffected. In 2 cases there was extensive phagocytosis of these cells by the Kupffer cells. These cases showed gross postnecrotic fibrosis, and diffuse fibrosis was seen in three others.

Liver fat was considerably increased in most cases of kwashiorkor. It was also increased in 6 of the 13 cases of marasmus and in only 2 of 30 cases of veno-occlusive diseases. The amount of fat bore no relation to the severity of the malnutrition. 7 patients with "kwashiorkor" did not have fatty livers. The authors suggest that these cases may have been misdiagnosed. Oedema was present in 40 of 45 of kwashiorkor patients and in only 1 of 13 marasmus patients.

Statistically, there was some correlation between the presence of oedema and the appearance of fatty changes in the liver.

The increase in water detected at autopsy in malnourished children was not confirmed by the results obtained by biopsy. It was concluded that biopsy material was not suitable for total water estimations, probably because of the small amount available.

Relatively large amounts of glycogen were found in the livers of patients with kwashiorkor and marasmus, who were taking a largely carbohydrate diet. The storage of glycogen was thus not impaired.

The ratio of nitrogen to DNA phosphate in malnourished patients was low compared with discharge biopsy figures. It appeared that in these cases some 25% of protein was lost. This was not the case in veno-occlusive disease. The authors conclude that this ratio does not give any real indication of protein loss.

The results of liver function tests are summarized in a table also

containing clinical and biopsy findings in 10 cases of veno-occlusive disease. Other results of liver function tests are not recorded or described.

The importance of histological and chemical examination of biopsy material in diagnosis and prognosis is emphasized. *B. G. Maegraith*

Van Oye, E. & Charles, P. L'hyper-gammaglobulinémie du noir peut-elle être considérée comme un caractère racial ? [**Should Gamma globulinaemia in Africans be regarded as a Racial Feature ?**] *Ann. Soc. Belge de Méd. Trop.* 1957, Dec. 31, v. 37, No. 6, 955–64. 2 figs. [18 refs.]

The English summary appended to the paper is as follows:—

" The authors made determinations of serum protein levels in a selected group of African Bantus and found a total globulinemia and a gamma-globulinemia similar to those encountered in Whites. They draw the conclusion that, in opposition to certain recent statements, there is no racial difference in the two groups on that particular point."

REPORTS AND SURVEYS

Moore, R. & Roberts, A. **A Short Account of a Medical Survey in the Kisii District of Kenya.** *East African Med. J.* 1958, Jan., v. 35, No. 1, 41–4.

A team of doctor, laboratory technician and assistants carried out a medical survey in the Kisii district of Kenya, sampling the population by asking whole families to report for examination. The method is admitted to be open to criticism, but wives and children did attend. Out of 497 whose blood was taken, 115 and 125 respectively were male and female adults and 257 were children. Each person had blood taken for haemoglobin, parasitological examination, Kahn test and blood group determination. Stools and urines of those who supplied specimens, 438 and 443 respectively out of 500, were examined. The doctor then made a physical examination and took a skin snip.

Tables give results of stool and urine examinations, haemoglobin levels, and average adult heights and weights. Ankylostomiasis and ascariasis were common at all ages, amoebiasis uncommon (2·6% adults and 0·5% children). Schistosomiasis was not diagnosed. No acute gonorrhoea was seen. The Kahn test was positive in 13·8% of adults. 35·6% adult males had haemoglobin of over 16 gm.%, though only 4% adult females and 2·2% children achieved this. (Wanjare, where the survey was made, is 5,600 feet above sea level.) Of malarial infections, only *Plasmodium*

falciparum was found, in 13·3% adults and 37·7% children (under 15 years of age). 3·4% adult males and 8% adult females were infected with *Onchocerca volvulus*.

[It would seem that the findings could be more fully described, and in some instances with better planning. For example, the infant parasite rate would be more informative than a general rate for children under 15. People with leprosy and the blind are not mentioned: possibly the method of sampling excluded them. A better method might be to select households, find out the names, and try to make an examination, of everyone in them. The paper records results of only one out of a series of similar surveys. Much interesting statistical raw material must remain.] *B. B. Waddy*

Moore, R. & Roberts, A. **An Investigation of the Pattern of Disease prevalent in Parts of the Rufiji District.** *East African Med. J.* 1957, Nov., v. 34, No. 11, 571–81.

Four villages in the Rufiji District in Tanganyika were visited by a team consisting of a doctor and two laboratory technicians. All school-children were seen, but otherwise only those who attended for medical treatment. Height and weight were measured, blood (films and haemoglobin), urine and stool were examined. Clinical examination apparently extended only to spleen palpation and " gross abnormalities ". The size of the population from which the patients came was unknown.

15 tables give mean heights and weights (not by age), haemoglobin levels, and frequency of some diseases and the findings are discussed. [The authors admit the shortcomings of their method of investigation, but state their belief that it indicates which types of diseases are most prevalent. The abstracter finds it difficult to share this belief.]

B. B. Waddy

BOOK REVIEWS

Davey, T. H. [O.B.E., M.D., D.T.M.] [Revised by.] **Blacklock and Southwell. A Guide to Human Parasitology for Medical Practitioners.** 6th Edition. pp. viii + 222, 119 figs. & 3 coloured pls. 1958. London: H. K. Lewis & Co. Ltd., P.O. Box 66, 136, Gower Street, W.C.1. [30s.]

This book has now reached its sixth edition and has been under the careful editorship of Professor T. H. Davey for the last two [this *Bulletin*,

1954, v. 51, 443]. It meets the needs of post-graduate students of tropical medicine as a guide to the subjects of protozoology and helminthology in one volume, probably also of workers in temperate climates who want a simple account of parasitic infections, and perhaps most usefully, of the increasing numbers of medical students of overseas universities like Ibadan or Makerere. The scope of the book is the same as in earlier editions, and it is written essentially for the medical reader with some interest in the laboratory aspect, and the implications of control, but not for the zoologist. Emphasis is thus laid on the pathogenic organisms, and it is quite a feat to have compressed a description of these into 200 pages of well-printed text; it has even been found possible now to include descriptions of *Toxoplasma* and *Isospora*, organisms of increasing importance today.

The newcomer to the subject will find the first three chapters very helpful: the practical approach, the use of the microscope and the simpler techniques, respectively. A chapter on the general subject of parasitology, comprising 2½ pages, is really too short; it could well be expanded to double this length to include descriptions of host-parasite relationships, the zoonoses, and the synecological approach on which the whole subject relies today.

A good description of the protozoa and helminths which affect man is given, accompanied by three coloured plates, numerous line drawings and vivid diagrams illustrating the life histories of helminths. There are a number of minor errors, *e.g.*, in the differential table of *Plasmodium* it is stated that large trophozoites of *P. falciparum* are not found [they are very common in African infections], Schüffner's dots in *P. ovale* are less (instead of more) deeply staining than in *P. vivax*, etc.; in the malaria life cycle, the oökinete is shown as penetrating the gut cells (instead of passing between them), the oöcyst with a double (instead of a single) cyst wall, etc.

It is difficult to understand why a description of the spirochaetes is included in this volume; if the spirochaetes, why not the rickettsiae? It would be useful if a companion volume were produced which would deal in the same way with these organisms and the arthropod-borne bacteria and viruses. *P. C. C. Garnham*

Academy of Sciences of U.S.S.R. [**Parasitological Symposium**] 1957, v. 17, 276 pp., numerous figs. [Numerous refs.] Moscow: Leningrad: Parasitological Department, Zoological Institute.

This volume contains a dozen papers on different aspects of parasitology, but all have a biological trend in that they deal with systematic or ecological characters of the parasites, rather than pathological effects or control. First, there are 5 papers on systematics of various parasitic mites (*e.g.*, Gamasid parasites of field mice, etc.), including one on

Russian species of Trombiculidae. There follows an account of histological peculiarities of the digestive systems of Ixodid and Argasid ticks. There is a paper on the various factors affecting attacks of blackflies (*Simulium* spp.) showing the effects of temperature, light, etc., on biting activities in the neighbourhood of a Siberian river. Next, there is a short note on biting midges (*Culicoides*) of the wet jungles of Ala-tai. The remaining papers are solely of veterinary or zoological interest. They concern biology of a warble fly, parasites of a vole, and Russian trematodes and cestodes parasitic on fishes.

The book is well printed and clearly illustrated. *J. R. Busvine*

NOTICE

Consideration has from time to time been given to the question whether it would be desirable to include authors' addresses in the headings of abstracts in the *Bulletins* and it has been decided that the additional time and cost involved would not be justified. Subscribers are advised, however, that the Bureau will, on request, notify them of the name and address of the author of the article, or the publisher of the journal, from which an abstract has been made.

The Bureau also deals with enquiries from individual subscribers relating in abstracts which have appeared in the *Bulletin of Hygiene* and the *Tropical Diseases Bulletin*; correct references and the exact nature of the information required should be stated.

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